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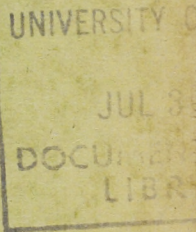
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DEPARTMENT OF THE INTERIOR  
FORESTRY BRANCH.

REPORT OF PROCEEDINGS OF THE  
SIXTH ANNUAL CONVENTION  
OF THE  
WESTERN CANADA  
IRRIGATION ASSOCIATION

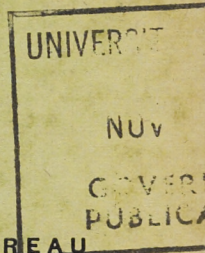
HELD AT

KELOWNA, B.C.  
AUGUST 13, 14, 15 AND 16, 1912



Published by authority of the Hon. Robert Rogers, Minister of the Interior

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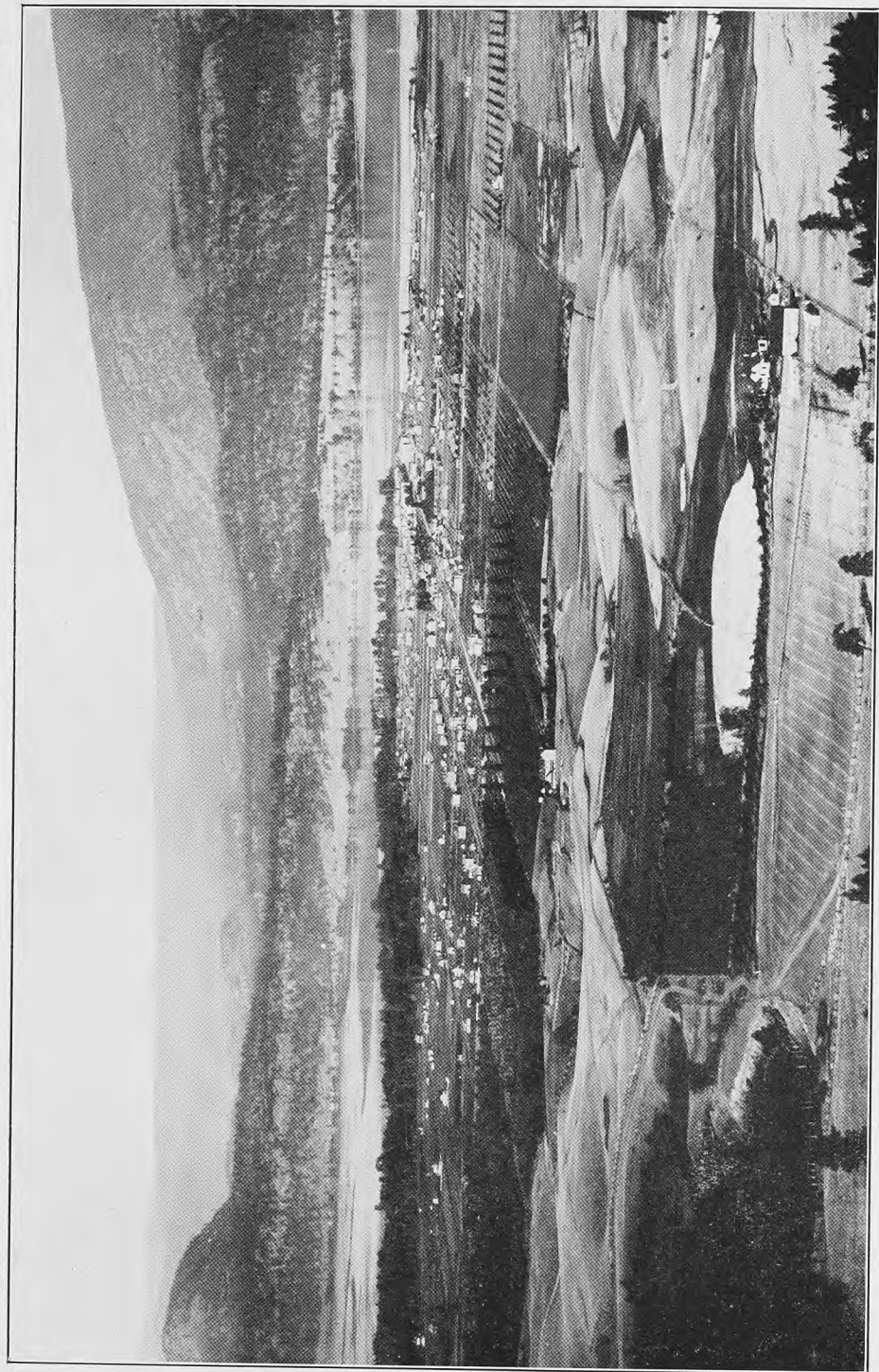












View of Kelowna from Dilworth Mountain.



DEPARTMENT OF THE INTERIOR  
FORESTRY BRANCH.

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## WESTERN CANADA IRRIGATION CONVENTION GREAT SUCCESS.

The sixth annual convention of the Western Canada Irrigation Association, held August 13 to 16, at Kelowna, B.C., in the Okanagan Valley, was undoubtedly the largest attended, the most enthusiastic, and in every way the most satisfactory meeting that has been held since this important organization was formed five years ago at Calgary.

The number of delegates from Alberta and Saskatchewan was at least three times as large as on previous occasions, when the association met in the Province of British Columbia, while the attendance from all parts of the irrigated sections in British Columbia was also greatly in excess of former occasions. In fact, the convention of 1912 marks a new era in the history of the association, and the splendid programme of prominent speakers and delightful entertainment was fully in keeping with the other outstanding features of the meeting.

With a registered attendance of nearly 160 delegates and a full gathering of the general public, the sessions of the association ran in attendance from 100 to 500, or an average of 300 persons at each session. Fifteen resolutions were moved and passed, dealing with problems relative to the west, while eloquent speeches were made by men, both north and south of the line, prominent in irrigation and agriculture.

The following was the result of the election of officers for the coming year:—Honorary President, the Hon. G. H. V. Bulyea, Lieut.-Governor, Province of Alberta; President, the Hon. Duncan Marshall, Minister of Agriculture, Province of Alberta; Vice-President, W. C. Ricardo, manager Coldstream Estate, Vernon; Vice-President and Chairman, J. S. Dennis, Assistant to the President, C.P.R. Executive: F. J. Fulton, K.C., Kamloops; Thomas Bulman, Kelowna; C. W. Dickson, Kelowna; J. A. Mackelvie, Vernon, west of the mountains; W. J. Elliott, Calgary; A. S. Dawson, Calgary; Wm. Pearce, Calgary; W. H. Fairfield, Lethbridge.

Interest in future conventions of the association was shown in the bidding for these meetings, Lethbridge getting the convention in 1913, Penticton going on record as bidding for it in 1914, and Bassano putting in a strong application for consideration in 1915.

The closing sessions took place at Penticton on the evening of August 16, when the new Incola Hotel was formally opened with a monster banquet at which 128 guests participated.

The success of the convention has resulted in its standing upon a very much firmer basis than it has done heretofore, and it is felt that its influence and its benefit for good will be very marked.

Owing to the amount of business on hand it was decided that a meeting of the British Columbia delegates take place in Victoria on January 9 and 10, when such matters as require the active attention of the government will be dealt with.

The association also decided to send the secretary and two delegates to the twentieth meeting of the National Irrigation Congress, which will be held in Salt Lake City at the end of September.



In preparation for the Sixth Annual Convention of the Western Canada Irrigation Association, the Local Committee had the following programme printed.

It was distributed at the different hotels, &c., in order that delegates, immediately on arrival, might know the place of meeting, and advise themselves beforehand of the resolutions to be brought forward, &c.

### **INTERIM PROGRAMME**

**Sixth Western Canada Irrigation Convention.**

**"Intelligent men no longer pray for rain—they pay for it."**

**Kelowna, B.C.**

**August 13, 14, 15 and 16, 1912.**

## THE WESTERN CANADA IRRIGATION ASSOCIATION.

### OFFICERS FOR THE YEAR 1911-12.

Honorary President—The Hon. T. W. PATERSON, Lieut.-Gov. of British Columbia.

President—The Hon. W. R. ROSS, Minister of Lands, British Columbia.

First Vice-President—J. S. DENNIS, Calgary, Alta., Assistant to President, C.P.R.

Second Vice-President—R. H. AGUR, Summerland, B.C. (deceased).

Treasurer—P. DU MOULIN, Kelowna, B.C., Manager Bank of Montreal.

Permanent Secretary—NORMAN S. RANKIN, Calgary, Alta.

Local Secretary—CHARLES W. DICKSON, Kelowna, B.C.

### EXECUTIVE COMMITTEE.

F. J. FULTON, K.C., Kamloops, B.C.

WILLIAM PEARCE, Calgary, Alta.

THOMAS BULMAN, Kelowna, B.C.

W. H. FAIRFIELD, Lethbridge, Alta.

C. W. PETERSON, Calgary, Alta.

W. J. ELLIOTT, Strathmore, Alta.

W. C. RICARDO, Vernon, B.C.

R. M. PALMER, Kamloops, B.C.

### LOCAL COMMITTEE.

J. W. JONES, Mayor of Kelowna.

R. B. KERR, President Kelowna Board of Trade.

Ald. D. W. SUTHERLAND.

F. E. R. WOLLASTON, Manager Belgo-Canadian Fruit Lands Co.



### NOTES.

Convention Headquarters—Meetings will be held in the Opera House, Raymer Block.

The Local Secretary's office is located in the Raymer Block. Delegates will kindly register with him on arrival, to be assigned sleeping accommodation.

### IMPORTANT.

Delegates are requested to register on arrival in a book kept for the purpose in the convention hall, and to leave their standard railway certificate with the secretary.

A badge will be issued to each delegate, and should be worn during sessions of the convention to enable the chairman to recognize properly accredited delegates.

A cordial invitation is extended to all interested to attend meetings of the convention.

The privileges of the Kelowna Club and the Kelowna Aquatic Association will be extended to delegates on application to the Local Secretary.

N.B.—Speakers rising to address the convention, unless called upon by the chairman, are requested to announce name and address for the information of other delegates, and to enable the official stenographer to report proceedings properly.

Be prompt in attending all meetings and excursions. Time is limited and we want to make the best of it.

## SPEAKERS.

Sir Richard McBride, Premier of British Columbia.

The President, Hon. W. R. Ross, Minister of Lands, British Columbia.

J. W. Jones, Mayor of Kelowna.

Prof. Alfred Atkinson, Department of Agronomy, Montana Agricultural College, Bozeman, Mont.—*The Irrigation of Alfalfa*.

Rev. E. McQueen Gray, Foreign Secretary National Irrigation Congress, Albuquerque, New Mexico—*Foreign Government Reclamation*.

A. E. Ashcroft, C.E., Engineer Canadian Northern Pacific Railway, Vernon, B.C.—*Public Ownership of Irrigation Systems*.

Dr. Samuel Fortier, Chief of Irrigation Investigations, U.S.A.—Selected subject (illustrated).

R. D. Prettie, Superintendent Forestry Department, Natural Resources, C.P.R., Calgary, Alta.

Prof. C. I. Lewis, State Agricultural College, Oregon—*The Relation of Irrigation to Fruit Growing*.

William Pearce, former President of the Association, Calgary, Alta.—*Irrigation and Forestry as Practised in Foreign Countries*.

F. H. Peters, Commissioner of Irrigation, Dominion Government, Calgary, Alta.—*The Proper Duty of Water and Necessary Irrigating Head in Western Canada*.

M. L. Dean, State Horticulturist, Missoula, Montana.—*Apple Culture and the Baldwin Spot*.

P. H. Moore, Superintendent Government Experimental Farm, Agassiz, B.C.—*Stock and Dairying, with Special Relation to Irrigation Farming*.

R. M. Winslow, Provincial Horticulturist, Victoria, B.C.—*Some Climatic Conditions Influencing the Duty of Water in British Columbia*.

Prof. W. J. Elliott, Superintendent of Agriculture, Department of Natural Resources, C.P.R., Strathmore, Alta.—*Irrigation and Intensive Farming*.

N. E. Webster, with Messrs. Niles & Niles, Public Accountants, New York—*Irrigation Finance*.

John T. Burns, Executive Secretary, International Dry Farming Congress, Lethbridge, Alta.

The Hon. Price Ellison, Minister of Finance and Agriculture, B.C.

J. S. Dennis, Assistant to the President, C.P.R., Calgary, Alta.

R. H. Campbell, Director of Forestry, Department of the Interior, Ottawa.

A. W. Bowser, President British North American Tobacco Co., Kelowna, B.C.



### IN MEMORIAM.

---

It is with feelings of profoundest regret that we chronicle the death of our Second Vice-President, Mr. R. H. Agur, of Summerland, B.C., which occurred on July 16 of this year.

Mr. Agur was also President of the British Columbia Fruit Growers' Association, and a man whose death will be keenly felt by all.

## INTERIM PROGRAMME.

**Tuesday, August 13.**

### OPENING SESSION.

8 p.m.—The convention will assemble in the Opera House, Raymer Block, for the opening session. The Hon. W. R. Ross, President of the association, will call the meeting to order and declare the Sixth Annual Convention formally opened.

8.15.—Address: Sir Richard McBride, Premier of British Columbia.

8.30.—Address of welcome: J. W. Jones, Mayor of Kelowna.

8.45.—President's report.

9.00.—Address: The Hon. Price Ellison, Minister of Finance and Agriculture, British Columbia.

9.15.—Address: J. S. Dennis, Vice-President, Western Canada Irrigation Association.

9.30.—Address: R. H. Campbell, Director of Forestry, Department of the Interior, Ottawa.

Delegates will register and hand in credentials and standard railway certificates to the secretary.

**Wednesday, August 14.**

### MORNING.

9.30.—Election of committees on resolutions and credentials.

10.00.—Secretary's report.

11.00.—General Business. Discussing balance of programme, constitution, &c.

12.30.—Adjournment for lunch.

### AFTERNOON.

The following papers will be presented:—

2.30.—E. McQueen Gray: 'Foreign Government Reclamation.'

3.30.—Prof. Atkinson: 'The Irrigation of Alfalfa.'

4.30.—A. E. Ashcroft: 'Public Ownership of Irrigation Systems.'

Time will be allowed for discussion and the consideration of resolutions.

### EVENING.

8.00.—Moving picture exhibition of irrigation scenes. (By courtesy of 'Dreamland' theatre.)

8.30.—Dr. Samuel Fortier: 'Illustrated Lecture on Irrigation.'

9.15.—R. D. Prettie: 'Irrigation as Applied to Forestry.'

**Thursday, August 15.**

### MORNING.

9.00.—Motor excursion through Glenmore, Ellison, Rutland and Black Mountain. Lunch at Eight Mile Creek.

Proceeding up Bernard avenue, we turn to the left, leaving the famous Bankhead orchard on our right, and in a few minutes enter 'Glenmore,' the property of the Central Okanagan Lands, Ltd. The irrigation system supplying this estate is



the one we are about to inspect, and for stability and thoroughness of construction it is worthy of close attention. As we proceed, the valley widens, and the main concrete ditch can be seen on our left, while on the right, high up on the side hill, is a smaller ditch from which the water is distributed to the individual holdings.

Passing the company's Ranch house, we see a high trestle carrying the McGinnis steel flume, used where a concrete ditch is impossible and piping is not desirable. Different types of metal flume are used in other parts of the system, including a mile of Hinman flume, the first of this type to be used in the province.

A short distance farther on, we can examine quite a variety of concrete work, including:—(1) Entrance to a 20 inch syphon, across part of the valley, which supplies a lateral; (2) sand box; (3) concrete ditch; (4) the water cushion at the foot of the 'throw away.'

Passing more high fluming, we leave the main road, and visit the 'Balance pool' of the main system. Here water is received and stored, the outflow into the main ditch being regulated to a nicety by the sluice gate and weir, with electric indicator. The pool, which has an ultimate capacity of 600 acre feet, also serves as a storage reservoir for very early or very late irrigation. The retaining dam has a concrete core carried down to bed rock, and the up-stream fall is double planked, with waterproof felt between the plies. The main work is peeled fir timbers, drift-bolted together in cribwork design, and with concrete sluice through the centre of the dam.

Following the course of the ditch, we take a short cut across to the main valley, passing the outflow end of the main pipe syphon. This syphon, which brings the water from the opposite side of the valley two miles away, is of heavy steel pipe, 30 inches and 32 inches in diameter, and capable of resisting a pressure of 100 pounds to the square inch.

Leaving Duck lake behind us, we see the ranch of the Hon. Price Ellison Minister of Finance and Agriculture, to our left. Several fine fields of tobacco may be seen on the Dickson ranch to our right.

At the turn of the road we leave our cars, and a twenty minute walk takes us to the intake end of the syphon, on our way noting the 'air vents,' 'expansion joints,' and other points about the construction of the steel syphon.

At the intake an earthen ditch, now being replaced by a more permanent cement-lined canal, diverts part of the water to the Cloverdale property of the Okanagan Land and Development Co., and the Rutland property of the Central Okanagan Company.

The measuring weirs and emergency spillway should also be inspected. Five minutes' walk up the glen of Mill creek takes us to the main headgate of the system, where the waters of the creek, thundering over a steep precipice, are brought into subjection to serve man's uses. The steel flume carrying the water most of the way down the glen, is on trestles in many places 50 feet high. The large concrete-lined dam, where the water is stored at the headwaters of Mill creek, is still many miles back in the hills, and time will not permit us to investigate this system further.

Returning to our motors, we start south once more, passing through Ellison and Rutland districts. In the latter we note many fine orchards, there being some 2,000 acres here under irrigation, a considerable portion being in bearing orchards.

We now commence a climb, which will bring us to the lands and irrigation works of the Belgo-Canadian Fruit Lands Company.

In about ten minutes we enter the 'Big Flat,' through a very prettily wooded country, mounting higher and higher to the foot of Black mountain. A beautiful panorama is here presented to us: glimpses of Mission creek far below, lake, valley and mountain spreading out to the horizon, with Kelowna in the hazy distance, on the shores of the Okanagan.

Finally we reach Eight Mile creek, the source of the domestic water supply for all the land we have driven through for the last hour or more, some 10,000 acres in all.

An inspection of the steel syphon at this point is interesting. It consists of 1,200 feet of 26 inch pipe, and carries water under a head of 260 feet. At Hepburn hill, the pipe is 9,000 feet long, varying in diameter from 14 to 18 inches, and carries water under a head of 500 feet.

A short walk shows us another variety of 'aqueduct,' in the carefully graded and sloped soil banks of the ditch, until we reach a fine example of wood stave fluming, specially designed by the company's engineer.

The source of water supply for this system is a lake at the head of the North fork of Mission creek. This has been dammed, raising the level of the lake 18 feet, and giving a reservoir of about 350 acres in extent. From the lake, the water is allowed to flow down the channel of the creek for about eleven miles to the intake where it is taken out into the ditch.

Our inspection of the various points of interest finished, we will return to the grove beside Eight Mile creek, where we will partake of a luncheon—the hospitality of our hosts, the Kelowna Land and Orchard Company, the Central Okanagan Lands, the Belgo-Canadian Fruit Lands Company, and the South Kelowna Land Company.

#### AFTERNOON.

The following papers will be presented:—

3.00.—Prof. C. I. Lewis: 'The Relation of Irrigation to Fruit Growing.'

4.00.—William Pearce: 'Irrigation and Forestry as Practised in Foreign Countries.'

5.00.—F. H. Peters: 'The Proper Duty of Water, and the Necessary Irrigating Head in Western Canada.'

Discussion of papers and resolutions as usual.

#### EVENING.

8.00.—M. L. Dean: 'Apple Culture and the Baldwin Spot.'

9.00.—P. H. Moore: 'Stock and Dairying with Special Relation to Irrigation Farming.'

9.30.—R. M. Winslow: 'Some Climatic Conditions influencing the Duty of Water in British Columbia.'

### Friday, August 16.

#### MORNING.

9.00—Election of officers and arranging for next year's convention.

10.00.—Motor excursion to Kelowna Land and Orchard Company Benches, South Kelowna Land Company Benches, and Okanagan Mission.

Leaving Kelowna, we turn south on our way towards the big orchard of the Kelowna Land and Orchard Company, and the many adjoining private orchards which go to make up the thriving locality known as the 'Benches.'

Before reaching this, about four miles out we catch a glimpse of a tobacco plantation, belonging to the British North American Tobacco Company, where high grade Havana and Comstock Spanish tobacco is now almost ready to harvest. Under a large shade tent experiments are being conducted in growing fine Sumatra leaf for cigar wrappers.

Our first stop is made at the gates of the 'Priests' orchard,' more popularly known as the K. L. O. Here by courtesy of the management we have an opportunity of driving around this magnificent property, the largest solid block of bearing orchard in the West, probably in Canada.

Proceeding across the Big Bench, we turn south and ascend to another plateau, through a succession of thriving orchards.

Leaving for the present these fruitful gardens, we pass through a section awaiting the development, which in a few years will transform it from a grazing country to a well settled and prosperous orchard community.

Arriving at Canyon creek, we will have an opportunity of inspecting the 'Out Take' works for the irrigation and domestic water supply, which has made possible the development of the orchards and gardens in the district through which we have recently passed.

If time will permit, we will next go to see the steel flume carrying the irrigation water for the South Kelowna Land Co., whose lands we shall presently drive through.

Turning south once more, our road takes us for ten miles among pines and firs, through which we catch occasional glimpses of distant lakes and mountains. Surveyors' pegs indicate that the South Kelowna Land Company, to whom this property belongs, is ready for business. This enterprising company has practically completed an up-to-date irrigation system, capable of serving some 8,000 acres of their holdings, the water being brought from their main storage reservoirs, some 20 miles back in the hills.

Finally we enter the district known as South Okanagan, or Okanagan Mission, which has been farmed successfully for some years, which contains some fine orchards. From here we take the boat for a trip down Okanagan lake to Penticton, where we are to be the guests of the City Council and Board of Trade for the rest of the day.

#### AFTERNOON.

12.30.—Leave Okanagan Mission by C.P.R. steamer *Okanagan* for Penticton.

4.00.—Motor trip around Penticton benches.

#### EVENING.

7.30.—Banquet at Incola Hotel, Penticton.

N.B.—Delegates intending to take the excursion to Penticton should arrange to have their baggage put on the boat at Kelowna, as we expect to proceed direct from Okanagan Mission to Penticton without returning to Kelowna. Lunch can be obtained on the boat, instead of at the hotel. This will give us more time for the Penticton trip. Arrangements are being made for excursion rates on the boat. The secretary and local secretary will have particulars.

Delegates who wish to take in the trip to Penticton will kindly notify the local secretary as soon as possible, as arrangements must be made for the banquet beforehand.

Delegates who take this trip can stay over night at Penticton, sleeping on the boat if they desire, and return up the lake on August 17, getting away at the same time as if they had remained in Kelowna.

## RESOLUTIONS.

### INTERIM RESOLUTION No. 1.

*Proposed by*

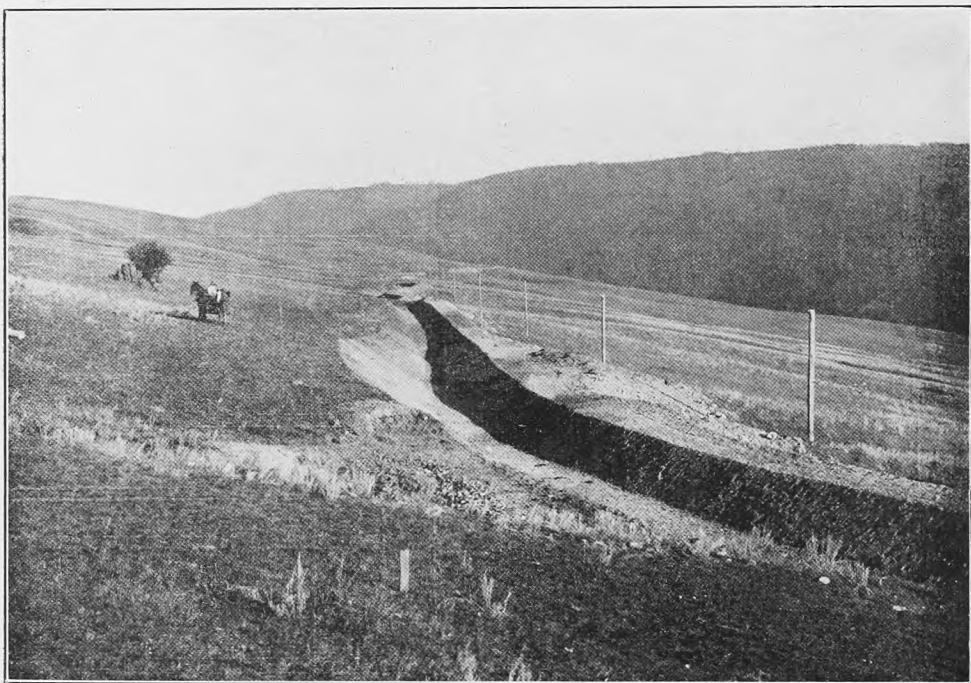
*Seconded by*

Whereas, the experience of the previous conventions of this association has shown that the problems and questions in connection with irrigation in the Province of British Columbia are widely different from those in the Provinces of Alberta and Saskatchewan, and has also shown that the number of delegates from British Columbia attending the meetings when held in Alberta or Saskatchewan is very small as is also the number of delegates from Alberta and Saskatchewan when the meetings are held in British Columbia,





Start of Automobile Excursion, August 15, 1912, Kelowna, B.C.



Belgo Canadian Irrigation Ditch, Kelowna.

Therefore, be it resolved that, in the opinion of this convention, it is advisable to form separate associations in the Province of British Columbia, and in the Provinces of Alberta and Saskatchewan, which, while remaining affiliated with each other, will hold their conventions separately.

INTERIM RESOLUTION No. 2.

*Proposed by*

*Seconded by*

Whereas the successful settlement of the Dry Belt of British Columbia is entirely dependent on an ample and permanent water supply for irrigation purposes and in the efficient and economical distribution of water to all land on an equitable basis; and

Whereas under present conditions of company promotion the water only serves limited areas in many districts, and a large amount of first-class fruit and farm lands is without a permanent or satisfactory water supply; and

Whereas the ownership and control for the safeguarding of the interest of the farmers and fruit growers would be better vested in the community, and bring about a feeling of greater security;

Therefore, be it resolved by the Western Canada Irrigation Association at this sixth annual convention that it is desirable that a scheme be formulated giving districts served from common sources of water supply the power to take over, control and operate for the benefit of all land in such districts all water records, irrigation companies and associations organized for purposes of supplying water, and that the Provincial Government be asked to co-operate in passing the necessary legislation and granting such other assistance as will be necessary to bring about a more satisfactory condition in water supply for the Dry Belt of British Columbia.

INTERIM RESOLUTION No. 3.

*Proposed by*

*Seconded by*

That whereas in many sections of this province irrigation would be of great benefit, but lack of capital prevents such work being undertaken;

Be it resolved, that this convention requests the Government of the Province of British Columbia to guarantee the interest of any reasonable scheme approved by a competent engineer.

INTERIM RESOLUTION No. 4.

*Proposed by*

*Seconded by*

Be it resolved, that the Western Canada Irrigation Association, in its sixth annual convention assembled, recommends that the Government of the Dominion of Canada be requested to instruct its representatives in several countries to investigate and report on the most successful methods in vogue in such countries for financing the farmers.

Be it further resolved, that as soon as the several representatives have so complied, the government at Ottawa request the several provincial governments in our Dominion to appoint two representatives each to confer with the Dominion Government at Ottawa, for adoption of the most practical system which shall be the basis of legislation to facilitate the raising of money by Canadian farmers for the development of the farming industry, and that such representatives shall be closely allied with and have practical knowledge of the needs and abilities of the farmers.

## INTERIM RESOLUTION No. 5.

*Proposed by**Seconded by*

Whereas, for the avoidance of disputes and in order to secure efficient administration, it is desirable that within incorporated cities in the 'Dry Belt' of British Columbia the maintenance and control of distribution of irrigation water should be in the hands of the municipal government of such cities;

And whereas existing legislation provides for the acquirement of control of irrigation by municipal corporations only upon surrender of all rights to water records or aliquot shares in water records by the property owners concerned;

And whereas it is practically impossible, owing to the minute subdivision of large tracts formerly held under one water record into hundreds of small parcels, to obtain surrender or transfer of interests in such records, owners in many cases being absentees;

And whereas it does not appear that it is needful for the purposes of maintenance of ditches, flumes and pipes and distribution of water that the records shall pass from the property owners to municipal corporations;

Therefore be it resolved, that the Provincial Government be requested so to amend the 'Water Act' and the 'Municipal Clauses Act' as to repeal the requirement for transfer of water records as a necessary preliminary to municipal control, and to provide municipal corporations in incorporated cities with compulsory powers to take over, administer and maintain irrigation systems in connection with land within such cities and distribute irrigation water to such lands as are lawfully entitled to share in the benefits of any water record, the cost of such maintenance and distribution to be levied by direct taxation upon the property served with irrigation water.

## INTERIM RESOLUTION No. 6.

*Proposed by**Seconded by*

Resolved, that the Dominion Government be requested to amend the Railway Belt Water Act:

1st. By including in its scope the amendments of the British Columbia Water Act of 1909 which have already been passed.

2nd. That clause 3 be revised and made clear with regard to:—

(a) 'Establishment' of existing rights.

(b) Definition of the nature of the riparian rights which are not to be disturbed.

(c) Whether the British Columbia Government may in any way interfere with existing 'established' or riparian rights.

## INTERIM RESOLUTION No. 7.

*Proposed by**Seconded by*

Resolved, that agreements between companies and individuals for the supply or conveyance of water for irrigation purposes, or for the supply of electric power for irrigation pumping, should be made on standard forms settled by the Water Commissioners after hearing the views of both contracting parties.



## INTERIM RESOLUTION No. 8.

*Proposed by**Seconded by*

That the government be asked to insert in the Water Clauses Act the following:—

That all plans of any irrigation works shall be subject to the approval of the government before any construction works are commenced, and subject to government supervision during construction, and that the government make an annual inspection of all such works.

## INTERIM RESOLUTION No. 9.

*Proposed by**Seconded by*

That the government be asked to inaugurate an Act for the purpose of forming an Agricultural Board, which Board shall hold annual examinations in all subjects pertaining to agriculture and issue diplomas to successful candidates.

## INTERIM RESOLUTION No. 10.

*Proposed by**Seconded by*

That the British Columbia Land Surveyors' Board be asked to include in their examinations the following subjects: Geology, Valuations of Property and Estate Management, Irrigation, Drainage, Forestry and Botany.

## INTERIM RESOLUTION No. 11.

*Proposed by**Seconded by*

That the government be asked to introduce an Agricultural Holdings Act to apply between landlord and tenant.

## INTERIM RESOLUTION No. 12.

*Proposed by**Seconded by*

That a clause be inserted in the Water Act making it compulsory that all companies or others using water for irrigation, mining or other purposes, shall keep their ditches, &c., free from noxious weeds, willows, brush and any undergrowth, and when water is carried through what has been a natural watercourse that it be confined to a stipulated area by pipes and flumes.

## INTERIM RESOLUTION No. 13.

*Proposed by**Seconded by*

That this convention urges upon the Government of British Columbia the necessity of establishing an experimental orchard in the Okanagan valley, or, failing this, that the government should carry out co-operative experiments relating to spraying, pruning, fertilizing, cover-cropping, irrigating, &c., in conjunction with the owner of some orchard, the work to be under the supervision of a departmental expert who would tabulate the results and be available to give advice to fruit growers.

## INTERIM RESOLUTION No. 14.

*Proposed by**Seconded by*

Resolved, that in the opinion of this convention, that in the event of more than one person occupying and using a ditch for conveying water for irrigation, legislation be provided through the Water Act that any co-partner neglecting to carry out his proper share of work necessary to keep the ditch in proper working order, shall be held liable and may be sued for the payment of such sums as may be necessary and deemed fair, and that the decision in such cases may be made and adjusted by the Water Commissioner.

## INTERIM RESOLUTION No. 15.

*Proposed by**Seconded by*

Resolved, that in the opinion of this convention it is advisable, that in subdividing lands, the plans of which are to be registered, and that are to be irrigated and sold for cultivation of fruit or other market produce, the government should consider the relative importance of main trunk roads, accommodation roads and lanes or by-roads, also the physical features of the country with regard to such roads, and the future requirements for tram lines for transportation of produce.

## INTERIM RESOLUTION No. 16.

*Proposed by**Seconded by*

Whereas in some of the semi-arid districts of British Columbia thousands of acres of splendid agricultural land are now lying idle for the want of irrigation; and

Whereas in most of these districts the land is held by small farmers who could not possibly afford to install complicated and costly irrigation systems; and

Whereas there is no doubt that in many of these districts artesian water in paying quantities could be obtained by drilling wells, say from 1,000 to 2,000 feet deep (in confirmation of which a 6-inch hole recently put down some 1,300 feet near Princeton yielded a flow of artesian water measured at 97 miner's inches); and

Whereas after artesian water had been struck and the depth and cost of such wells ascertained, the farmers in the neighbourhood would then be in a position to figure on driving their own wells, thereby placing their lands under cultivation; and

Whereas important geological and mineralogical information could be obtained during the drilling of these wells which might lead to the opening up of such valuable natural resources as coal, gas, oil, or precious metals;

Therefore be it resolved, that the Government of British Columbia be urgently requested to take the necessary steps toward putting down test holes throughout the province, and set aside the required funds for same.

## RESOLUTION OF SYMPATHY.

Moved by the Hon. Price Ellison,  
Minister of Finance and Agriculture,

Seconded by W. Crawley Ricardo:

Whereas the province has sustained an irreparable loss in the death of Mr. R. H. Agur, of Summerland, who by his active efforts and personal influence has accomplished so much towards the successful development of the horticultural industry of this province, and more especially that of the Okanagan valley, and who has always shown his great interest in the intelligent conservation and application of water for irrigation purposes.

Be it therefore resolved, that this meeting in convention assembled, does hereby tender its sincerest sympathy to Mrs. Agur and family in their sad bereavement, and that the secretary be instructed to forward a copy of this resolution to Mrs. Agur.



## THE WESTERN CANADA IRRIGATION ASSOCIATION.

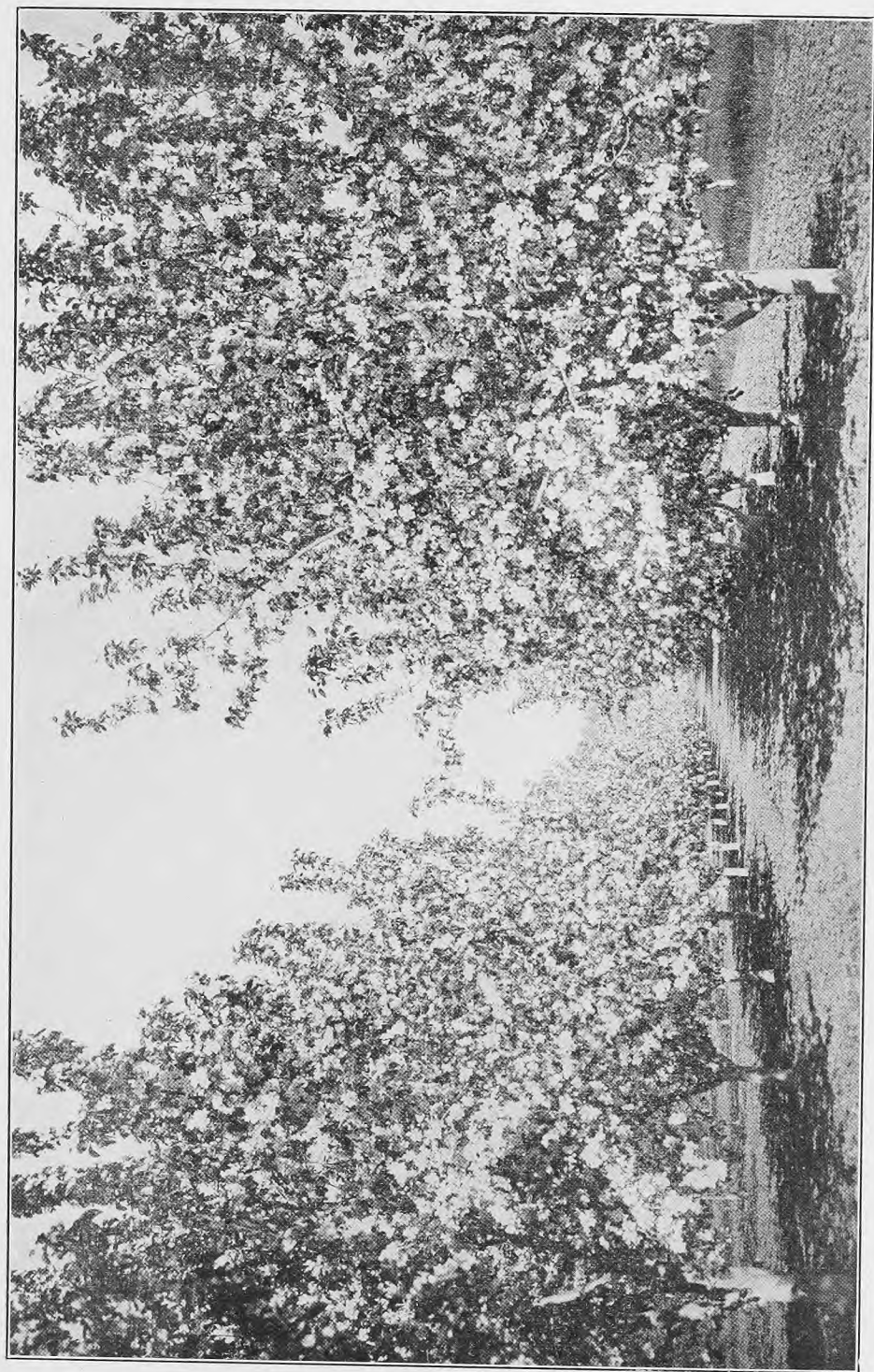
### OFFICERS FOR THE YEAR 1912-13.

- Hon. President—Hon. GEO. H. V. BULYEA, Lieutenant-Governor, Province of Alberta.  
 President—Hon. DUNCAN MARSHALL, Minister of Agriculture for the Province of Alberta.  
 First Vice-President—W. CRAWLEY RICARDO, Manager, Coldstream Estate, Vernon, B.C.  
 Second Vice-President and Chairman, Executive Committee—J. S. DENNIS, Assistant to the President, Canadian Pacific Railway.

### EXECUTIVE.

- THOMAS BULMAN, Kelowna, B.C.  
 A. S. DAWSON, Calgary, Alberta.  
 C. W. DICKSON, Kelowna, B.C.  
 W. J. ELLIOTT, Calgary, Alberta.  
 W. H. FAIRFIELD, Lethbridge, Alberta.  
 F. J. FULTON, Kamloops, B.C.  
 J. A. MACKELVIE, Vernon, B.C.  
 WILLIAM PEARCE, Calgary, Alberta.  
*Permanent Secretary*—NORMAN S. RANKIN, Calgary, Alberta.

NEXT PLACE OF MEETING—LETHBRIDGE, ALBERTA.



Crab Apple Blossoms, Major Lindsay's Orchard, Kelowna, B. C.

REPORT OF THE PROCEEDINGS  
OF THE  
SIXTH ANNUAL CONVENTION  
OF THE  
WESTERN CANADA IRRIGATION ASSOCIATION  
HELD AT KELOWNA, B.C.  
ON  
AUGUST 13, 14, 15 AND 16, 1912.

OPENING SESSION—TUESDAY EVENING.

The sixth annual convention of the Western Canada Irrigation Association opened in Kelowna, B.C., on Tuesday, August 13, at 8 p.m.

The chair was taken by the Hon. W. R. Ross, who, in calling the convention to order, spoke as follows:—

You will join with me in the regret I express that we are not able to have with us to-night our Premier, Sir Richard McBride. He is detained by other important engagements and was not able to avail himself of your invitation. He has, however, sent the following telegram, and I would ask your indulgence while I read it:—

VICTORIA, B.C., August 13, 1912.

Hon. W. R. Ross,  
Western Canada Irrigation Convention,  
Kelowna, B.C.

Kindly extend to the Western Canada Irrigation Convention assembled at Kelowna, a most hearty welcome from the government and people of British Columbia, and best wishes for success in the movement which has for its object the advancement of the prosperity of the western portion of Canada. Kelowna and the splendid section surrounding it form an object lesson of the magnificent result to be attained by irrigation and of what energy and enterprise can accomplish. Please express my personal regrets that owing to very important engagements I am unable to be present, but I feel that the government is well represented by you and the Minister of Agriculture.

RICHARD McBRIDE.

To this telegram, the following reply was subsequently sent:—

KELOWNA, B.C., August 15, 1912.

SIR RICHARD McBRIDE,  
Premier,  
Victoria, B.C.

The keen interest that you have always shown in the deliberations of the various conventions of this association is ample proof of your live appreciation of the impor-



tance of the problems under discussion, and consequently the Western Canada Irrigation Association in session wish to express their great disappointment at your inability to be present. Convention has been most enthusiastic, discussion keen and attendance largest in history of association. One hundred and fifty-three registered delegates, with public attendance to extent of 500. Fifteen resolutions passed. Work of association for past year commended enthusiastically. British Columbia delegates will convene for business meeting at Victoria during December. Many prominent irrigation, agriculture and government officials present.

W. R. ROSS,

*President.*

We are going to vary the printed programme this evening by appointing the committees on credentials and resolutions, and I would ask them to get to work immediately as there are delegates attending who wish to return in the morning and the secretary will be unable to sign their certificates until he receives the report of the committee. As a committee on credentials, I appoint Messrs. W. H. Fairfield, Thomas Bulman and R. M. Palmer. As a committee on resolutions, I appoint Messrs. J. S. Dennis, F. J. Fulton, W. C. Ricardo, W. J. Elliott, W. A. Lang and W. S. Foggo.

The next item of business is an address of welcome by Mayor Jones, of Kelowna.

MAYOR J. W. JONES.

MR. PRESIDENT, LADIES AND GENTLEMEN.—I am delighted to respond to the invitation of the chairman to address a few words of welcome to this large and important convention assembled here to-night, and am sure that during your stay here we will show you every kind attention. When you arrived this afternoon, I think you observed that the portcullis was raised, the drawbridge let down and the gates thrown wide open, and the very first thing we did was to send you on a joy ride around the city to your different billeting stations. I hope that during your stay in Kelowna you will continue to experience the same happy thrill of joy that you did on entering the city. I think we all realize that this is going to be a very important convention. One fact alone is sufficient to claim that, and that is that you are meeting in the Orchard City of the Okanagan. The invitation extended last year—which was accepted—was accepted wisely, I think. In your visit here, you will see very much that will interest you from a tourist point of view. You will also see very large and important irrigation works, and also you will have an opportunity of visiting some of our beautiful and large orchards in the district surrounding.

As expressed by the chairman to-night, we certainly feel deep regret at the absence of our Premier, Sir Richard McBride. It is a matter of regret to the citizens of Kelowna. We were hoping that on this occasion we might have had the pleasure of offering our congratulations to the Premier on the honour of receiving a knighthood at the hands of our Gracious Sovereign. But, sir, there is another reason besides that expressed in the telegram. I think that only a few months ago Sir Richard said that the next time he came into Kelowna he hoped he would be riding on a passenger train. We could scarcely expect him under those conditions this time, but we hope to have him do so in the near future. It may be rather too late in the

day for us to offer our congratulations to him, but we hope, however, that the time is not far distant when such a signal honour as has been paid to Sir Richard McBride may also be paid upon your own head, and that we may offer our congratulations to you.

This is going to be a very important convention. Decorating this hall, you will see flags of another nation as a token of honour to our distinguished guests from across the border, and looking over the list I find that we have representatives from different parts of Canada from the Atlantic to the Pacific. Besides this we are also to have here representatives from some of the foreign countries, and we shall be delighted while we are here to show them the surrounding district and to make their visit a very pleasant one. I may say also that we are delighted to note—because a few days ago a feeling of regret came over the Local Committee when we heard that the Hon. Price Ellison, Minister of Agriculture, was seriously ill—that Mr. Ellison is here with us on the platform in his usual robust health. It would have been a great loss to this convention had Mr. Ellison not come. I don't think there is any gentleman in the upper country who has taken so deep an interest in irrigation as the popular member for Okanagan, and it is a matter of great delight to me personally, to think that he is sufficiently able to sit on the platform to-night, and I hope that the convention will have the benefit of his advice throughout its gatherings.

While extending a welcome to those who have come to us from afar, we must not forget to extend a hearty welcome to the speakers from across the border of the neighbouring republic. (Applause.) There is no doubt there is very much for us to gain here from their advice and investigations they have made over the neighbouring states. But my welcome to-night goes far beyond that, and I would like to extend it particularly to those men who have in our own country devised and financed the big schemes that have turned the desert places into beautiful valleys and green fields. In fact, it seems to me that the men who have to bear the worry and brunt of these huge undertakings are really the conquerors of the wilderness. A tribute should be paid to those men in this convention, and I would like to extend the hearty welcome of this city and district to these men who have done so much.

Possibly no district in this great and beautiful province of ours can show so much for expenditure as Kelowna can. It will be your privilege to go out over these works and inspect them and see the very latest plants, because I think that we have right here methods possibly more advanced than in other districts. During last year, the sum of two and a half million dollars was expended in irrigation works in this district. Last year over 130,000 fruit trees were planted in this district, and this year over 200,000 were planted out, so we are beginning to see the benefits of irrigation in these young districts. I would also like to call your attention to the tobacco industry which has gained such a footing here. Samples of this product you will see in the windows along the street, and very likely you will have an opportunity of testing the fragrant weed that has been manufactured right in this district. The British North American Tobacco Company is a very strong company, and the officers of that company will be pleased to take you through their factory and show you how the cigars are made. As I have said, it will be your pleasure, no doubt, and your privilege to inspect all these large orchards that are scattered throughout our wide and fertile valleys. You will also have the privilege of going through our packing

houses and canning factory—one of the largest and best in the Dominion of Canada—and I hope you will possibly gain some idea of the steps we have taken here during the past five or six years, in order to handle the large fruit crops coming into this city.

I need say nothing further, Mr. Chairman, ladies and gentlemen, than to again extend to you a very hearty welcome. I hope that your visit will be a very pleasant one, and that the deliberations of the convention will do much towards working out the better handling of the great bodies of water flowing through these districts, and also that the laws will be assisted by the measures passed here and handed on to the government. We welcome you most heartily to this city. We have thrown open our homes to you and we are at your service for a jolly time, so that when you leave your only desire will be to come back and possibly settle among us at some later date. (Applause.)

CHAIRMAN.—Mr. Fulton will reply to Mayor Jones on behalf of the Western Canada Irrigation Association, but, before he does so, I would ask the committee on credentials to get together and commence operations.

F. J. FULTON, K.C.

Mr. PRESIDENT.—I could have wished that some better speaker than myself had been called upon to reply to the welcome which the Mayor of Kelowna has extended, but, as I have been called on, I will do my best.

Mr. Mayor, on behalf of the Western Canada Irrigation Association I wish to express to you the thanks of the association for the very kind and hearty welcome which you have extended to this convention. I experienced one of those joy rides that the mayor spoke of, from the boat to the quarters allotted to me, and very pleasant quarters I found had been allotted, and I only hope that the other delegates who have come here will find themselves in as good and hospitable quarters as I have. That ride was extended afterwards to one around your vicinity, when I had an opportunity of seeing some of the orchards of which the mayor has so eloquently spoken; and, looking around this neighbourhood and seeing what has been done by irrigation in this locality, it seems to me that it speaks well for the success of this convention. It can hardly help but be successful when we see what has been done by irrigation right in this neighbourhood. The meeting here to-night also augurs well for the success of this convention. I may say that I have attended all the meetings of this association since its inception. This is the sixth annual convention, the first being held in Calgary six years ago, and I cannot recall that we ever had as good a meeting as that here assembled to-night. (Applause.) So that the welcome which the mayor has extended I think, should beyond doubt, tend to make this a most successful meeting. Mr. Mayor, I can only say in conclusion, on behalf of the association, I again thank you very heartily for the welcome you have extended. (Applause.)

CHAIRMAN.—The next item on the programme is the presidential address.

## HON. W. R. ROSS.

In touching briefly upon the affairs of this association for the past year, I want to say that I, in common with the other officers of the association, have taken a keen interest in the progress we have made. The many minor matters incidental to the successful carrying on of the work require considerable correspondence and personal attention, but I think we all feel that any efforts put forward to advance the work in hand help us on to the goal towards which our association is headed. When you consider the vast organization of our big brother association across the line, with its steady income and permanent staff, and how that staff is promptly moved to and operated from the point chosen for the following year's congress, I think every credit should be given our young association for bringing together a gathering such as



Photo by Rankin

Some of the Delegates at Penticton, President Ross in the Foreground.

this, and presenting a programme so well filled with noted speakers and so overflowing with instruction and entertainment.

Our resolutions of last year have, one and all, been taken up by the Dominion Government and acted upon, while financial support has been promptly supplied by the Dominion and British Columbia governments. I am informed—and Mr. Bennett's letter leads me to believe it—that the grant from the Dominion Government is an annual one, and the secretary's statement shows a sufficient balance on hand to insure a continuance of active work and publicity.

We are pleased to see with us to-night such noted stranger irrigationists as Sir William Wilcocks, Dr. Samuel Fortier, Professor Lewis, Mr. E. L. Dean, Professor



Atkinson, and also Mr. John T. Burns, Executive Secretary-Treasurer of the Dry Farming Congress to be held at Lethbridge in October, and to welcome them to this part of the world. We are sure they will go away with pleasant recollections of this gathering from what they see and hear.

There are a number of telegrams and letters from those who are unable to attend, which the secretary will read, while death in the last month has taken away our esteemed officer and friend, Mr. R. H. Agur, a reference to whose death will form the subject of a special resolution.

We are glad to see the dry farming interests with us to-night, in the person of Mr. John T. Burns, whom we will have the pleasure of hearing to-morrow.

As I understand the secretary's report will cover all details of the year's work very fully, I will not enlarge upon the same at this time, but will call upon Mr. Rankin to address us in accordance with the order of the programme. I would like, before closing, to congratulate the convention upon the selection of such an able secretary as Mr. Rankin. (Hear, hear.) The result of his efforts in the preparatory work of this year's convention is very marked, and I think I am voicing the opinion of every member when I express the hope that the association will have the benefit of Mr. Rankin's services for many years to come. (Applause.)

CHAIRMAN.—The next item on the programme is an address from the Hon. Price Ellison, Minister of Finance and Agriculture for British Columbia.

#### HON. PRICE ELLISON.

MR. CHAIRMAN, LADIES AND GENTLEMEN.—I was not aware that I was to address this meeting until I saw my name on the programme. However, I am delighted to be here to-night and also to welcome you as representative of this district and on behalf of the Government of British Columbia. I think to-night it gives me more pleasure to speak to you on irrigation on account of our chairman having taken such an active part and done so much towards irrigation. He, in the first place, secured the services of Professor Etcheverry, of whom you have all heard, and the report of Professor Etcheverry will be presented to you to-morrow, bound in leather, as a souvenir to those who are delegates of this convention. It is a very masterly report, full of information, and in getting Professor Etcheverry, the Minister of Lands looked around and got the best that was obtainable, gentlemen, and he is noted for that, and when a man does that he always has the satisfaction of knowing that people will say, 'Well, you have got the best man obtainable.' And advice is always cheap from that kind of man no matter what it costs. Especially does that apply to those men who year by year are doing a little something towards putting water on the land. It is a very important thing indeed, and the emblem of the Western Canada Irrigation Association is a woman holding a pitcher of water and pouring it down on the ground, and I am glad to see so many ladies present at this convention to-night. Were it not for the benefits of irrigation in this district there would not be so many beautiful hats and costumes worn as there are on this occasion. (Laughter.)

This year we have been very fortunate indeed. We have had more rain than I remember for a good many years. During my residence in the Okanagan, I do not

remember that it ever rained before so heavily in April, May, June, July and August. Nevertheless, while we are thankful for this, we cannot always depend on it, and it is irrigation we need, and since the Minister of Lands has taken such an active part in the work of this association, I wish you to convince him during these proceedings that it is the duty of the government to take hold of this matter in a most thorough way. There is no doubt that what the mayor has said of irrigation in this valley is true. The people of Kelowna, and the irrigation companies in the Okanagan and Kamloops districts especially, have done wonders for British Columbia. I am sure that you will be enthusiastic when I tell you that many of these medals (indicating), largely gold medals, were won at the largest exhibitions in the world, principally by irrigated products from these valleys, and this is the famous Stillwell Trophy (indicating), won last year by British Columbia at New York for potatoes, the Irishman's standby. I am sure we are all proud of this. Almost every state in the Union and every province in the Dominion of Canada competed. This trophy was gained entirely without special preparation, and we scarcely thought of entering, but Mr. Dennis got after the department and said, 'Get an exhibit.'

I said, 'Consider; we are not prepared; we have not measured off the land. The potatoes are all planted; we have not cultivated and not fertilized, and we are not in a position to compete for the prize. However, we will try.' You are all proud of the result. This trophy is yours, and each and every one of us will feel we did well indeed. There is no place or state but what envies this great trophy, valued at one thousand dollars, and sterling silver. This is irrigation. A large number were from the parts of the lower mainland, but it is safe to say that without potatoes grown by irrigation we should not have won that trophy, gentlemen. (Applause.)

Some four years ago at the convention at Vernon, I spoke of a scheme and suggested means for the government going into irrigation. I said, 'Let the government get engineers and run a survey line of all the arable land, and then bring water on and tax every acre benefited, and collect this tax the same as other taxes are collected.' Since then the School Tax has been levied in a way similar to what I advocated at that time. There is no risk about it—none whatever. The land is there and always will be there. Land that is not now worth a dollar an acre would be worth from one to three and four hundred dollars an acre. I said that the government could borrow money at three per cent, but now we have money of our own to lend; let us put it into irrigation. (Applause.) We have millions of dollars in the chartered banks of this province, and I think it is an opportune time to tap the bank for irrigation, gentlemen; and I know if there is any feasible scheme that we shall have the support of the chairman and Mr. Fulton, and many others who opposed me at that time who are in this hall to-night, who thought it was not the right thing to do and that the scheme was too large, and that we could not get interest on our money without charging the people who used the water too much. A paper will be read to you on this subject by Mr. Ashcroft, and I hope some scheme will be brought up whereby we can take advantage of the millions of gallons of water around us, sufficient to water every acre of land in this whole valley. And why should hundreds of people go short of water—in fact, some without any at all? It is a money-making business for the government; it will increase the prosperity of the country, and when you are helping

to build up the country in any way, it is helping the government who undertakes to do those things.

A few years ago Sir Richard McBride was in Kelowna, and we were talking of the great possibilities of the valley. I said at that time that the fruit industry of British Columbia would dwarf every other industry of British Columbia—lumbering, mining, fishing and everything else. That was five years ago. Sir Richard looked at me and said, 'I don't see how you make that out.' I said, 'It is very simple indeed.' We have three-quarters of a million trees planted now, and it is safe to say that there will be two millions in a few years—and I am glad to say there is over that number planted already—and at five dollars a tree, a very small estimate indeed, you have ten million dollars.' There are men in this room who have got ten to fifteen and twenty dollars a tree. I had the pleasure of motoring down with the Hon. Mr. Ross, and he said he was surprised, and would not have believed there was such a country. Perhaps the improvement is more patent to me than to any one here, because I saw it all in the raw and appreciate the difference. I am indeed proud to represent such a constituency. It is overflowing with milk and honey, gentlemen, and will be; and what more can you wish? (Applause.)

I am glad indeed that we have with us at this convention Sir William Wilcocks, perhaps the greatest living expert on irrigation in the world, and when I stop to think of what he told me a few moments ago, I almost feel ashamed to appear before you at all to address you. He was addressing the Royal Geographical Society in London. It took him three years and a half to write that address, gentlemen, and he delivered it in an hour and ten minutes. (Applause.) Now he has been honoured and knighted and we are all proud of him, and hope to have the privilege of hearing him before this convention closes. He has been in the most ancient places in the world, where irrigation was practised thousands of years ago, and will tell us perhaps of how millions of acres have been watered by the aid of bullocks, horses, asses and ponies. Just imagine what water means to the land in those countries.

I am sure, with your co-operation, that we shall accomplish something that will justify the government in aiding us. We don't want them to take hold of any scheme that will not be a credit to yourselves and to the benefit of the government. Anything that will go to better your condition, so far as water is concerned, will have my hearty support, and I shall be glad to hear of the men who opposed the scheme that I suggested some four years ago being in line and accord with the government doing something that will relieve the situation. It is true that the people now have done wonders. These companies have done wonders, but don't forget that if they have not yet made money out of their operations, they intend to do so, and not merely by the enhanced value of the land. We are glad of it. We do not want to see anybody put money in this land without getting a good return. These men ventured and took it upon themselves to secure and supply the water. These men will have to get more interest on their investments than they are getting to-day, and to do that the rate for water per acre per annum will have to be increased, and we don't want that. Thus the whole problem is to get money at a cheap rate over a term of years, and the land is always good for it.

I thank you very much for this opportunity of speaking to you, and hope that your convention will be a great success. And I thank the people of Kelowna for

providing so well to make it such. (Applause.) I cannot close without a reference to Mr. Rankin, who has worked so hard to make this convention the success it ought to be. I have had so much correspondence with him and I know something of the labour involved, and trust that we shall have the benefit of his services for many years to come.

CHAIRMAN.—As Mr. Ashcroft's paper may provoke discussion, copies of it may be had at the door. I will now call upon Mr. J. S. Dennis, First Vice-president of the association.

MR. J. S. DENNIS.

MR. PRESIDENT, LADIES AND GENTLEMEN.—Four years ago I had the pleasure of speaking to the delegates assembled at the meeting of the Western Canada Irrigation Association held at Vernon, and I have very much pleasure to-night in being given an opportunity of meeting some of those who were present at that time, and of again speaking to you for a short period on the subject that is the reason for our meeting.

We must, I assume, take it for granted that this question is one of sufficient importance to all the dry belt in British Columbia to justify busy men in giving up a portion of their time without any remuneration and at their own expense, to attend these conventions, in the hope that the meetings will result in some good to the general public as well as to themselves. The Western Canada Irrigation Association is young in years, but has already accomplished quite a marked work in connection with this very important matter. At that meeting in Vernon to which I referred, I made it the subject of my remarks to deal with a question which at that time was agitating those interested in the use of water, and possibly expressed somewhat strongly the views I held on the subject; but I am pleased this evening on beginning my remarks to you, to say that, as a result of the meeting of the association at Vernon, steps were taken by the government to deal with the very important question of the law relating to the use of water. And I think it is only fit that having spoken on that matter as I did at that time, I should take this opportunity, to say to you that this convention should not allow the opportunity to pass without appreciating the work which was done by the then Minister of Lands, the Hon. Mr. Fulton, in having corrected and brought to pass in the local legislature a law somewhat drastic, but without which all those engaged in irrigation in this province were face to face with disaster. I am glad to have the opportunity on this occasion to say that in my opinion the thanks of the people of British Columbia, and of the delegates assembled at this convention, and of every one concerned, should be extended to Mr. Fulton for the work he did at that time. (Applause.) I wish further, before I proceed with my few remarks, to say that the work which was begun by him in the passage of that Act has been taken up and carried out in a thoroughly systematic, well considered, intelligent and bold manner by his successor, the Hon. Mr. Ross. (Applause.)

Those who expected that the mere passage of that law was going to solve all the difficulties of irrigation naturally were, and will be, grievously disappointed. The first step was in considering the question of the law; then the necessary amendments made to it, and the consolidation of all into one concrete Act and its passing through



the legislature. The next step was the important one of putting it into force. this it is an absolute certainty that somebody's toes and, in fact, a large portion their bodies, are bound to be trodden on. No law, based as it had to be upon a g many laws of the character previously passed, can be enforced from the standp of doing what I endeavoured to say at the Vernon convention in my opinion had be done, 'cleaning house,' could be administered on that basis without caus more or less friction. I sincerely hope that as a result of this meeting in Kelowna those who are vitally interested in this subject will see fit to give every poss support to the Honourable the Minister of Lands in the enforcement of the Water Act.

I purpose for a very brief time to endeavour to express to you why I am of opinion that the whole success of the use of water in this province, the whole success of the investments that are being made at many places, the whole success of marked development that we can see adjacent to Kelowna, is absolutely dependent first, last and all the time, upon well considered and well administered laws relating to the use of water. The value in all irrigable countries is in the water, not in the land. You have great areas in this valley which have been proved suitable not only for the growth of grain and fodder crops; for very exceptional root crops, including the potatoes, to which the Hon. Mr. Ellison referred and which in competition with the whole of America won this trophy (indicating); and also capable of producing a very high-class fruit crop; but you may take it for granted that a vast portion of that area would not produce anything were it not for the water distributed through irrigation systems. Therefore in this valley, as in every other valley dependent upon the use of water, the real value is in the water more than in the land. There is no land in this vicinity suitable for grazing and dry farming which as such is perhaps to-day worth from five to twenty dollars per acre; whereas you can sell such land subject to a water right at from \$150 to \$400 an acre. Now, what causes the difference? Not the soil, not the climate, of which you are very justly proud, ladies and gentlemen. It is not any effort you put into it. It is the water you are able to bring in by irrigation systems from streams to distribute over the land; and that applies everywhere where water is used for irrigation.

If that is correct, is it not reasonable and proper to say that the law relating to the water, which is the valuable commodity, should be just as good as, if not better than the law relating to the holding of title to the land? And yet they are matters of very different concern. Your law relating to the holding of titles to land has come down through centuries, and in this western country has been improved upon by taking into account the best points of the law in Australia and elsewhere; and the introduction of the Torrens system improved by legislation, we are in a position to say that a man owns or does not own a piece of land. Until you give, and even another person in British Columbia gives the government true and loyal support administering the present Water Act, you will never have the same title to water that you have to the land. It is not possible. You have not got it to-day and never will have it until that Act is administered as I am quite sure the Hon. Mr. Ross intends to administer it, and until you can produce the same good evidence of ownership of water.

I hope, ladies and gentlemen, that as a result of this convention, those delegates from east of the mountains and our neighbours from south of the line will endeavour to give the delegates of British Columbia every possible assistance they can in formulating and passing here such resolutions as are the unanimous voice of this convention, and as are necessary to strengthen the hands of the government and its officials in the administration of this Act. When we hold another convention in British Columbia, as I feel quite sure we will before very long, because our association is a growing one, and in British Columbia as far as fruit irrigation is concerned, you have the only area in Canada along that line—I trust that then some speaker may be able to point out that the result of this convention and the convention at Vernon and your discussions and resolutions proved a help and assistance to the government to provide what you need—in my opinion—a clean-cut administration of the Act you now have.

Now, ladies and gentlemen, will you let me say just two or three words on our association—what it is, what we have accomplished, and what we hope will be accomplished. The Western Canada Irrigation Association was started a few years ago, as our president has said, in a small convention held in Calgary. We were then east of the mountains, and as we were just commencing irrigation undertakings, we thought it desirable to have a little meeting and get together those interested in the subject which was spoken of at that time as ‘Dennis’ Fad,’ or Pearce’s or somebody else’s fad. As a result, this association was organized. We have had five meetings since then. This is the sixth and the third in British Columbia. East of the mountains, since that time, our irrigation undertakings have grown from small beginnings until by the end of this year there will be some ten million dollars invested in existing works. With you, your irrigation projects have extended from small beginnings until you have a number of comparatively large schemes, well thought out and constructed. Therefore it is reasonable for us to say that our association has been associated at least with a work that is growing in western Canada, and a work which it may be claimed quite properly is daily playing an important part in that development of western Canada of which we are all so proud. That development, ladies and gentlemen, not only east of the mountains but in British Columbia, is a development which for rapidity, permanency and general results is in advance of anything that has happened on this western continent. It has been much more rapid than has taken place south of the line in the same period of time, and it is a development which after all must be looked upon as the basis upon which we are to build up a great, prosperous, contented and happy people in this western portion of the Dominion. And if our association has been able to assist, even in a small way, in establishing that development as related to irrigation on permanent lines, we have accomplished a good work. Some of our meetings in the past have been poorly attended; but I join with our president in saying that this meeting, the first evening of the convention, is the most largely attended we have ever had. (Applause.) It is surprising that down in the Okanagan valley, lying away from the main line of communication, in a district which after all is sparsely populated, in a district which in comparison with future development is only partially developed, we should be able to bring together a larger number of delegates from east of the mountains than in any other convention we have held. But it is not so surprising when we remember

that not only in Canada, but south of the line, and particularly on the other side of the Atlantic—I can say this based upon my own experience in discussions, public meetings and interviews in all of the districts I have mentioned—British Columbia to-day is standing out as the most attractive, the most alluring portion of western Canada. (Applause.) It may be, and I suppose properly should be, that the name of British Columbia has attracted from Great Britain rather more than Manitoba or Saskatchewan—those provinces called Manitoba, Saskatchewan or something of the kind over there; Alberta is a purely English term of course—but British Columbia seems to be a term which means to the people of Great Britain not going to a foreign country, but coming home; and that is the reason for a larger proportion from the other side coming to this province. (Applause.) But it must not be forgotten that this province has certain responsibilities if it is going to take care of those people. I have spoken of one in connection with the law. Let me speak of one other somewhat delicate subject—a subject I have had the presumption, may I say, or as we say on the prairies, the nerve, or as the cowboy says, the gall—to suggest to the government on several occasions. There is this further responsibility—a responsibility which I am quite sure the Honourable the present Minister of Lands appreciates—a more complete survey system than we have. This is somewhat of a fad of mine. I have talked of it to the predecessor of the Hon. Mr. Ross, and to his predecessor the Hon. Mr. Green, that we should have something more as a foundation for a survey system upon which to base the title to your land of which I spoke a short time ago.

The climate you have here in British Columbia proves sufficiently attractive to enable you to get more than your proportion of the people who are coming into this country. We are endeavouring to tempt more than our proportion with our prairie crops, but it is difficult to do because there is British Columbia appealing to them. Also from that movement of people it is quite certain, in my opinion, that southern British Columbia particularly, is on the eve of sharing in the great movement from the west and northwest, which will not stop if we should erect a wall one hundred feet high all along our boundary. That movement began a good many years ago by a trend of people to the west from across the Alleghany mountains, and has continued until there is no large area of good land available for settlement, and they have moved on and on until they have overflowed our boundary, that imaginary line—imaginary in the sense that they do not have to climb a wall and get over it. This year the movement will result in at least 150,000—and I have had the nerve to prophesy over 200,000—people spilling over the brim into western and northwest Canada and into British Columbia; and it is certain that a vast number of people are going to come in to the southern part of this province and occupy these valleys. As far as British Columbia is concerned, it is a mountainous country, and it is only possible to colonize and develop it in the valleys. These are connected with chains of mountains and by high ridges which add to the difficulties of railway construction, and it is gratifying to note that exceedingly fine policy of the present government in this province of the construction of a system of trunk roads, because after all the road is the basis of all transportation. (Applause.) Without it, it would be useless for the Canadian Pacific Railway Company to spend vast sums of money in building railways over these mountains if it were not possible to get to them by a good system of

roads. And I am very glad to have this opportunity of saying that I appreciate, and I am sure you appreciate, the work that is now being undertaken in this connection.

It is only possible, as I have said, in the southern part of this province, to colonize and develop in the valleys, although without the mountain ranges on each side we would not have that life-giving water for the irrigable districts. But in those valleys is it at all a vision, ladies and gentlemen—and I have the credit, or the reputation, for indulging in visions—is it a vision at all for me to say to you that many of those standing in this hall and listening to me will live long enough to see all the valleys in southern British Columbia, from the international line to the connecting main line, populated to the extent that every possible area in those valleys will be occupied? It is a certainty in my mind, because conditions as they exist here will appeal to those people, and it is only necessary that those of you here—pioneers and newcomers alike—should put your shoulder to the wheel; not to say, ‘we are going to sit down till the government does this and somebody else does that,’ but that you, as living here in the west, with the obligations of the west upon you, will resolve to do everything in your power and by every possible means that can be adopted, not only to better your own condition, but to make known to the world the fact of what you have and to extend to the world a general invitation to come and share in it. And I feel sure that you will, especially in this district of Kelowna, unless you feel you have such a good thing that you are selfish enough not to want anybody else. But there is an obligation on the part of everybody in southern British Columbia and in the west as a whole to take up their share and show the world at large that western Canada to-day offers them unbounded opportunities; and that here you have grazing lands, fruit, timber, coal, metalliferous mines and stores of natural resources not possessed by any other country in the world—and to open the door and invite their colonization by the white man. (Applause.)

Ladies and gentlemen, I have to thank you for listening to these words on subjects in connection with which my life has been spent in the west, as a very intense western Canadian; and I feel certain that as a result of our meeting here and the deliberations which we will be able to give to the important motions presented to the convention, the good work of irrigation will be greatly assisted and all the many correlated questions to be considered in connection therewith. They are many, diverse and difficult, and it is only by getting together—I may use that term of ‘get together, keep together, and, if you get away, get together again’—that we can hope to deal with these very important things. It is only through the medium of such meetings as this, an individual and collective effort, that those very important questions and the subject of the law relating to the use of water in this province can be put on the basis they should be, no doubt will be, and will have to be before you can hope to reap all the benefits which will accrue from the expenditure of money, effort and intelligence in producing in these valleys the magnificent fruit and vegetable crops, and later on, I hope, in many areas crops of live stock and dairy products, that they are capable of producing.

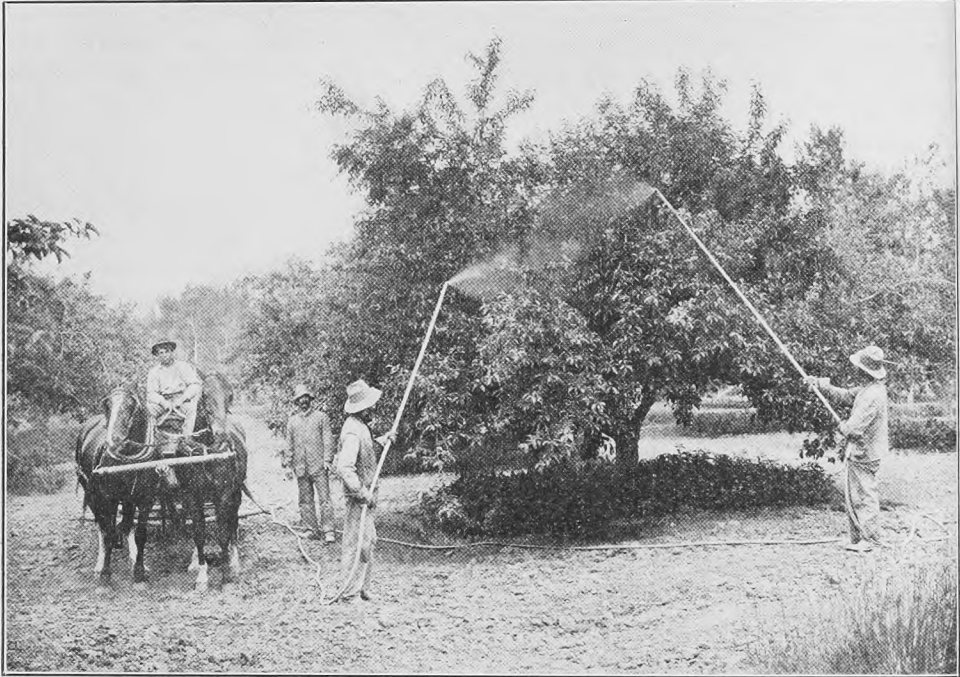
I am exceedingly obliged, ladies and gentlemen, for your attention, and greatly appreciate this opportunity of welcoming you as vice-president of this association, and can echo the words of Mr. Fulton that we appreciate very much the kind welcome extended to us by the mayor, and the exceptionally kind manner in which we have been received by the people of Kelowna. (Applause.)



CHAIRMAN.—The committee on credentials ask that those delegates who have their certificates and credentials will leave them with the committee before leaving the hall. The local secretary, Dr. Dickson, has an announcement to make.

DR. DICKSON.—I wish to mention that delegates are invited to make full use of the privileges of the Kelowna Aquatic Club, and also of the Kelowna Business Men's Club.

CHAIRMAN.—I will call upon Mr. R. H. Campbell, Director of Forestry, Department of the Interior, Ottawa.



Spraying, Kelowna, B.C.

MR. R. H. CAMPBELL.

MR. CHAIRMAN, LADIES AND GENTLEMEN.—I don't know exactly why I am placed upon the programme this evening, but I presume the reason is that it was decided to have some person who might be considered as in some way a Dominion representative. I do not have the honour of having a seat in the House or any such important position as that. I am only a member of His Majesty's Civil Service and therefore I can only represent the Dominion in a very subordinate and humble way. But seeing that there is no person else to do it, I presume that I was placed upon the programme to represent the Dominion view of things in so far as I can, and I would like to say just in starting, that I fully agree with the remarks by previous speakers in regard to the very pleasant manner in which we have been received. It is a great pleasure to us to come here. Perhaps you may think that a person who comes from

Ottawa where they have typhoid fever cases as a result of impure water, running up to six or seven hundred, should hardly come to Kelowna or anywhere where water is being talked about (laughter), because down there we have pretty nearly decided that we will have to give up using water altogether (laughter).

Anything that affects the prosperity or the future of the Dominion is of vital importance to every citizen of the Dominion, and I do not think that whether we belong to western Canada or eastern Canada we should take a small view of the Dominion or take a small view of our responsibilities to Canada. Canada is not a country that is on this side of the mountains or on the other side of the mountains. Canada is a country that stretches from the Atlantic to the Pacific. (Applause.) We are proud of the development that is going on throughout the length and breadth of the Dominion. We are proud that our country is making progress in all its parts and whether it is in the east or in the west we are glad to see that development, and glad that, as citizens of the Dominion, we are certain to have some fair share in it and some personal reason to be proud of it, so that I may come here and talk to you with some pleasure as a citizen of the Dominion, at seeing the development which has resulted from irrigation and from the enterprise of the people of this district.

When we consider the conditions in our country, we find that as the country develops they are becoming more complicated day by day. In the early days, when our fathers came into this country, conditions were simple. Then they could live the simple life. They did not have to give very much consideration to the future. Their future was rather circumscribed; but as our country is developing, as all matters become more complicated, as things become larger and more far-reaching, we have to consider them not only in their present development and influence but we have to consider what is to be their influence in the future, and I, perhaps, may fairly claim that the subject with which I have had considerable to do in this country—the subject of forestry—has had more or less to do with bringing that view-point before our people.

You know, the forester has to look pretty far ahead. The lumberman does not necessarily have to do so. He has his crop of trees to cut and his object is to harvest and make as much as possible, and that is a perfectly good object; but when the forester comes on the ground and begins to look at the forest, he considers not only the forest that is there before him, but also the forest of the future. A tree may take sixty, seventy, eighty or a hundred years to grow and develop into a size useful for timber, and the forester looks over—as he can look over—very large tracts of our country and finds much of it covered with small trees, and he must look forward thirty or sixty years to the time when the crop shall become ripe and ready for use. He must take a long view of things, and that long view has been passing into other lines of activity in our public life and has generally been designated as a policy of conservation. (Applause.)

As citizens of the Dominion we are interested in the development of all parts of the Dominion, and as citizens of the Dominion you are interested, I presume, in what the Dominion Government is doing and what policy it is carrying out in the administration of matters under its care. In connection with irrigation, the Dominion Government in the districts of Alberta and Saskatchewan where it administers the water formulated in the first place a good statute—and in fact the credit

for the formulation of the law on that subject is due to Mr. J. S. Dennis, who was then in charge of irrigation matters for the Dominion (applause); and that law embodies the point which Mr. Dennis has made clear to-night, that is, that the title to the water should be made simple and clear.

But, as Mr. Dennis pointed out, if you merely have a statute on the books, you have not accomplished anything. We have many good laws that are practically dead letters because they go no farther than the statute books. There never was any country yet where the laws did the work. You have to have an administration which is adequate in numbers and ability to the carrying out of the law which it has charge of, and I would like just to say this, that we have in the civil service of this country (people often talk pretty lightly of the civil service, and perhaps they have some reason to do so) many men who are trying to do their duty thoroughly and to the best of their ability to discharge a public service. And I wish to say this further, that, if the people of this country are to have the right kind of administration, they must support the men who are trying to administer their resources properly. They must give us sufficient men to do it and remunerate them sufficiently to attract men of ability to handle these resources as they should be handled. We do not expect that in the government service the remuneration will be equal to that in other services, and perhaps we must take consolation in the fact that if we are doing our duty properly we are doing a public service and part of our return must come in that way. It is of absolute importance that we should have not only a good law but an administration adequate to the carrying out of that law.

The subject that I am more particularly and directly handling in connection with the Dominion administration is the subject of forestry, and I think that is a matter of importance to this convention and a matter it is fitting you should take cognizance of. The water supply for all our irrigation schemes, waterworks and other uses for which we require water comes from the heights which are usually covered with forest growth, and the forest undoubtedly has a considerable effect on the stream flow, both in regard to quantity and regularity, and therefore there is a direct connection between the irrigation interests and the forestry interests. And there is no need either for any clash between the forestry interests and the agricultural interests. The forest is as a rule now on lands not well fitted for agriculture—on the water-sheds, on the high rocky places—and those are the places where we wish to retain them. In order to administer the forests properly, we must have some permanent place for them, as it is such a long term crop, and those places are the hill slopes and the high, broken land and rocky ridges, so that the two things, irrigation and forestry, can then work together.

The forest is a living thing, and that is the one thing that makes it possible for us to do something in forestry—something to direct the life in the forest. The tree is living and grows by laws which may be known and worked out. The forester must learn these laws and the conditions under which the tree grows; how quickly it produces wood. From a knowledge of these things we have worked out a method of protection to the best of our ability; and in the Dominion service we are trying to build up a staff that can handle the forest properly. The chairman has begun the adoption of a forest policy in British Columbia which I am sure will be a credit to the province, and one of the reasons I am sure is that he has shown the good judg-

ment to come to the Dominion forestry service for a number of the men whom he has selected for that work. (Applause.)

In the administration of the forest there is undoubtedly scientific knowledge required—not that it is to be handled on theoretical principles or principles that are not suited to conditions—but the men who are laying out the work must have learned something of the methods which are being followed in other countries and must have planned out their work on lines learned from the experience of other countries. As the Dominion grows older, we find conditions becoming more complicated, and we must look out beyond our own borders and find how things have been done in other lands; how policies have been developed and how resources have been handled under other conditions; and although we cannot adopt absolutely the policies of other



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countries, we can learn from them some of the lines along which we must follow and work.

We have already organized a fire preventive service for the Dominion forests, but if another dry year like 1910 should follow immediately I do not know how far we can handle the situation. We are working for a thorough system of fire protection and if we can only get a few wet years, probably both the British Columbia Government and the Dominion Government will have their protective service so organized that we can prevent serious fires like those which occurred in that dry year.



We are also developing in the study of conditions that affect the growth of the forest. There are many questions which require to be investigated yet before we can work out thoroughly the methods that should be followed in the handling of the forests of the Dominion, but we are laying the foundation at the present time for a forest policy which I hope will in time work out to be a strong factor in the preservation to us of one of the greatest resources that the Dominion has. (Applause.)

### WEDNESDAY MORNING SESSION.

The convention reassembled at 9.30 a.m.

CHAIRMAN.—The next order of business will be the reading of the secretary's report.

#### SECRETARY'S REPORT.

Mr. NORMAN S. RANKIN, Permanent Secretary, then submitted his annual report, as follows:—

MR. CHAIRMAN, LADIES AND GENTLEMEN.—Before going on to read my report to you I want to say that though the report when printed will cover fully and comprehensively the operations of the association for the past year, I think it only necessary this morning to touch on those points which are most important and which will be of special interest to the convention.

What the association is doing; how we are doing it; and the results obtained in this doing, are matters which every interested delegate would doubtless like to know, and if you will bear with me for a little while, I shall make that little while as brief as possible.

Our publicity campaign has been carried forward along well-considered, carefully-thought-out lines, and results are, as you will see, already beginning to show.

During the past year we have accomplished something. As will be seen from appended official communications between your secretary and the Dominion and Provincial governments, the resolutions passed by the association at the last convention have been followed up and all of them carried to an issue. Most of them met with favourable consideration and support. Indeed, better than that, for not only did the Dominion Government approve and advise special appropriations to carry out investigations, surveys or works, but in addition, added a grant of \$500 to aid us in our work.

In order to attain this end, I thought it advisable to personally visit the Hon. Minister of the Interior, which I accordingly did at Ottawa early in November. There the matter was laid before him and his assurance of interest and support received.

On August 30, I forwarded your resolutions to the Dominion Government, receiving acknowledgment of their receipt from the Hon. Mr. Oliver as follows:—

Letter from the Hon. Mr. Oliver, Minister of the Interior, Ottawa, to the secretary, under date of August 29:—

DEAR SIR,—In Mr. Oliver's absence, I beg to acknowledge receipt of your communication of the 25th instant, transmitting a resolution of the Western Canada Irrigation Association, and in reply to say that I shall be pleased to bring this to Mr. Oliver's attention on his return.

Yours faithfully,  
(Signed) J. E. FEATHERSTON,  
*Private Secretary.*

From that date until November 14, when I called upon the Hon. Mr. Rogers at Ottawa (the minister having changed with the government in the meantime) no further communication was received from the government. Correspondence was then reopened as follows:—

Letter to the Hon. Robert Rogers, Minister of the Interior, Ottawa, from the secretary, under date of November 14:—

SIR,—I have the honour to attach you hereunto copies of resolutions moved and passed by this association at its recent congress in Calgary.

A reference to these letters will indicate that they were forwarded to the late Minister of the Interior on September 6, and, as no reply has been received regarding them, I beg that you will at your early convenience give them your attention, in order that our executive may be informed regarding them.

If I am fortunate enough to have five minutes with you to-day, there is a further matter of interest which I would like to discuss with you.

I have the honour to be, sir,  
Your obedient servant,  
(Signed) NORMAN S. RANKIN.

Letter to the Hon. Robert Rogers, Minister of the Interior, Ottawa, from the secretary, under date of November 15:—

SIR,—Relative to our conversation this morning and my brief exposition to you of the active work of the Western Canada Irrigation Association in the western provinces, and the resolutions passed by the association at their annual convention at Calgary last August, which were duly transmitted to the late Minister, copies of which I handed you, permit me to state that these resolutions were in the hands of the late Minister in September, and I am informed upon inquiry at the Irrigation office of the Forestry Branch, that the resolutions in question were never forwarded to them by the department for explanation or action.

I earnestly request the attention of the department to these matters in order that at the next convention of the association I may be able to report that such and such a resolution has met with the approval of the department, who advise that they are prepared to act upon it at such and such a time, or otherwise.

This association was formed by public-spirited men to deal with all agricultural questions to benefit the farmer in general, and only by getting the assistance and support of the Dominion and Provincial governments can our work be most effective. To bring about and maintain this condition, all our efforts are directed.

I respectfully refer you to Director Campbell and Mr. Drake, of the Forestry Department, who are fully cognizant of the work we have been doing.

I have the honour to be, sir,  
Your obedient servant,  
(Signed) NORMAN S. RANKIN.

Letter to the Hon. Robert Rogers, Minister of the Interior, Ottawa, from the secretary, under date of November 15:—

SIR,—Referring to our conversation this morning and my brief exposition to you of the active work of the Western Canada Irrigation Association, under instructions from the Executive Committee, I write to ask your department to assist us in spreading throughout western Canada a better knowledge of the principle of irrigation and the benefits derived therefrom, with a grant of \$2,000.

The Western Canada Irrigation Association was formed four years ago, and is without revenue except such aid as has been received from the Provincial governments in the provinces in which annual conventions have been held.

The association is growing steadily in membership and effectiveness, and it is our aim to bring it to the same position of importance and influence in Canada that is occupied by the National Irrigation Congress in the United States.

Our convention held last August in Calgary was largely attended by western Canada's prominent agricultural men, irrigationists, government superintendents of experimental farms, &c., and if funds are available it will enable us to invite across, to address the 1912 convention to be held at Kelowna, British Columbia, some of the foremost irrigation and soil experts. A commission from the Western Canada Irrigation Association has been invited to, and will attend, the National Irrigation Convention to be held in the city of Chicago, December 5 to 9 next.

Hitherto your department has been very generous in printing free of charge the reports of our annual convention, one of which I append for your information.

I have the honour to be, sir,

Your obedient servant,

(Signed) NORMAN S. RANKIN,

*Permanent Secretary.*

To these on December 2 and 18, I received the following reply:—

Letter from the Assistant Secretary, Department of the Interior, Ottawa, to the secretary, dated December 18:—

SIR,—I am directed to acknowledge the receipt of your letter of the 14th ultimo, addressed to the Minister of the Interior, enclosing copies of certain resolutions passed at the last annual convention of the Western Canada Irrigation Association, and to reply as follows:—

RESOLUTION NO. 2.—‘Whereas the conservation of the forests on the eastern slope of the Rocky mountains, so as to promote the gradual melting of the snow and equalization of the run-off of storm waters, is one of the most important factors in the successful irrigation development of southern Alberta; and

‘Whereas an order in council has recently been passed greatly restricting the area of the Rocky Mountain Park and thus withdrawing from the area now excluded the close fire-guarding and general conservation which has in the past been devoted to the said Park;

‘Therefore, be it resolved that the Hon. Minister of the Interior be requested either to extend the boundaries of the Rocky Mountain Park to cover the original area set apart or to greatly augment the fire-guardian service now in successful operation in the forest reserves in the Rocky mountains, in order to adequately cover the area now excluded from the jurisdiction of the Park's administration.’

In regard to this resolution, I am directed to say that the Minister has approved of an appropriation which will provide for a more thorough protection of the forest reserve on the eastern slope of the Rocky mountains, and that plans are being made for an extension of the organization for the protection of the reserve and for making it more effective.

RESOLUTION No. 3.—‘Whereas a knowledge of the practical duty of water for various crops has a most important bearing on irrigation development; and

‘Whereas information upon this important question, available in any of the provinces of Alberta, Saskatchewan and British Columbia, is vague and incomplete;

‘Therefore, be it resolved that the attention of the governments interested should be directed to this important matter, and that they should be urged to carry out a thorough system of investigation to determine the duty of water in the different provinces and for the different crops, so that such duty may then be determined by approximate exactness.’

A special sum is being included in the estimates for irrigation work to provide for investigations in regard to the duty of water, and these will be taken up so soon as the appropriation is available. It is expected that considerable work will be done next season.

RESOLUTION No. 4.—‘Whereas an accurate knowledge of the location and quantity of water supply available is the basis of irrigation development; and

‘Whereas the matter of topographical and hydrographic surveys to determine the location and quantity of such water supply and the proper methods of conserving it must be undertaken by the government administering the law relating to the use of such water;

‘Therefore, be it resolved that this convention urges strongly upon the Dominion Government the importance of making the necessary appropriations and providing the necessary staff to continue in an intelligent and systematic manner the work of gauging all streams of water-supply and location of all sites suitable for reservoirs for the storage of water, initiated a number of years ago.’

In regard to this resolution, I am directed to say that an increased amount has been included in the estimate for the coming year for the carrying out of this work, and it is intended to make a considerable extension of it.

RESOLUTION No. 6.—‘Whereas the conservation of water for irrigation purposes by companies and individuals as at present carried out does not admit of the whole available area in each district being brought under cultivation; and

‘Whereas the conservation of water by the government would be the means of developing such areas to the fullest extent, assure absolute permanency of supply and materially increase the security to bondholders;

‘Be it resolved that the governments in which such districts exist be urgently requested to give the matter their serious consideration and to put such system into operation at the earliest possible date.’

In regard to this matter, I am directed to say that, while the department cannot state what the ultimate policy will be in regard to the construction of works, arrangements are being made for carrying out the necessary investigations to determine the proper location for such works and the amount of storage which can be developed.

Your obedient servant,

(Signed) L. PEREIRA,  
*Assistant Secretary.*

#### INSTRUCTION IN AGRICULTURE IN ALBERTA.

Resolution No. 5, regarding the establishment of an agricultural college in the Province of Alberta, was forwarded to the Hon. Duncan Marshall on August 30, and receipt duly acknowledged. No action having been taken by November 21, I again wrote to the Hon. Minister of Agriculture, and made a personal visit to Edmonton, but without securing any definite reply. On March 7, I again approached the government, receiving on the 14th the following reply:—

Letter from the Hon. Duncan Marshall, Minister of Agriculture, Edmonton, to the secretary, dated March 14:—



DEAR SIR,—I have your letter asking what steps the government has taken in the establishment of an agricultural college, and in reply would inclose memorandum of what we propose doing in agricultural education, from which you will see that it is not our present intention to immediately establish an agricultural college.

Yours very truly,

(Signed) DUNCAN MARSHALL,  
*Minister of Agriculture.*

#### MEMORANDUM:

The policy of the Alberta Government is to erect upon two or three of the demonstration farms, agricultural schools to be supplemented by other schools as the demand grows; to begin in these schools with a three months' course, at the end of which term a diploma will be granted in practical agriculture, this diploma to be an entrance to the agricultural college to be established later on, where the scientific course in agriculture will be given to the man who wishes to obtain the degree of Bachelor of Scientific Agriculture. The exact details of these courses will, of course, be determined as the system is developed, but it is intended that they shall include instructions in live stock and grain, soil cultivation, dairying, poultry raising, course in mechanical work, such as blacksmithing and carpenter work as is required on the farm; courses in the operation of gasoline and steam engines, and instruction for girls in domestic science. By establishing these schools in different parts of the province they will be easy of access to farmers' sons, and experience has gone to show that the nearer you can bring a school to the farmer's boy the better chance he has of availing himself of its instruction. These schools will be placed on the demonstration farms and there the students will have the very great advantage of the practical work done on the farm. They will be able to observe from day to day the application of scientific methods to a farm no larger than most farmers in the province occupy, and this land being operated with a view to making its occupation profitable. It is quite true that in the erection of an agricultural college it is comparatively easy to build what will be a bigger show place with the appearance of doing greater things, but that is not our object in this province. Our determination is to bring scientific instruction in agriculture as near home to the farmers in different parts of the province as possible.

Letter from the Hon. Robert Rogers, Minister of the Interior, Ottawa, to the secretary, dated December 2:—

MY DEAR SIR,—Replying to yours of the 15th ultimo, I beg to say that it has been decided to authorize a grant of \$500 to your association, and also to provide for the printing of the annual report.

Trusting that this will be satisfactory.

Yours sincerely,  
(Signed) R. ROGERS.

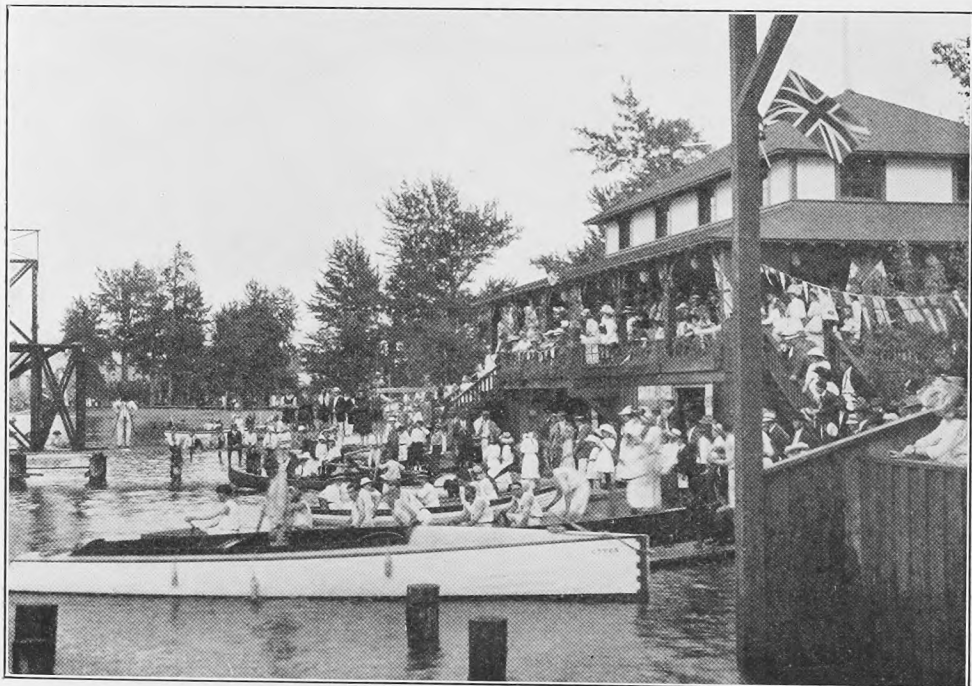
#### GRANT FROM BRITISH COLUMBIA GOVERNMENT.

Letter to the Hon. Richard McBride, Premier of British Columbia, from the secretary at Chicago, under date of December 7:—

DEAR SIR,—Acting on instructions from the Executive Committee, I respectfully solicit the financial aid of your government to enable this association to carry on the important work of spreading throughout western Canada a better knowledge of irrigation, and the great benefit to the country at large to be derived therefrom.



The Beach and Boat House at Kelowna.



Regatta Day, Kelowna, B.C.

The Western Canada Irrigation Association was formed four years ago by public spirited men in order to take up, discuss and aid the farmers in all problems which from time to time may confront them, and is without revenue except such aid as has been received from the Provincial governments in the provinces in which annual conventions have been held. The association is growing steadily in numbers and effectiveness, and our aim is to bring it to the same position of usefulness and importance in Canada that is occupied by the National Irrigation Congress in the United States. Our convention held last August in Calgary was largely attended by prominent western Canada agricultural men, irrigationists, government superintendents of experimental farms, &c., and if funds are available, it will enable us to invite across, to address our 1912 convention to be held at Kelowna, British Columbia, some of the foremost United States irrigation and soil experts.

A commission from the Western Canada Irrigation Association is now in attendance at the Nineteenth National Irrigation Congress in the city of Chicago, and this representation marks an important forward step in the history of our association (it being the first occasion that the association has sent a delegation to the congress) widespread publicity and interest is being secured for western Canada.

I respectfully refer you to the Hon. Price Ellison, Minister of Agriculture, and to the Hon. R. W. Ross, Minister of Lands and President of our association, as to the work which the association is carrying on in the west, and earnestly solicit a grant of \$2,000 towards the forthcoming convention and the general preparation of our work in the west.

I have the honour to be, sir,

Yours respectfully,

(Signed) NORMAN S. RANKIN,  
*Permanent Secretary.*

Letter from the Hon. Richard McBride, Premier of British Columbia, to the secretary, under date of December 12:—

DEAR SIR,—I beg to acknowledge your favour of December 7, asking for assistance from the government towards the Irrigation Convention to be held at Kelowna in 1912.

I shall be glad to bring the matter to the attention of the Hon. W. R. Ross, the Minister of Lands, and to do what I can in recommending it.

Yours very truly,

(Signed) RICHARD McBRIDE.

Letter from the Hon. W. R. Ross, Minister of Lands, Government of British Columbia, to the secretary, under date of December 26:—

DEAR SIR,—I beg to advise you that I have recently taken up the question of a grant to be made by this government in aid of the association's work this year.

I now have a memorandum from the Minister of Finance that the sum of \$2,000 will be placed in the estimates for the purpose.

Trusting this will be satisfactory and that you will meet with success in the other quarters where you have solicited aid, I remain.

Yours very truly,

(Signed) W. R. ROSS,  
*Minister of Lands, and  
President Western Canada Irrigation Association*

As will be seen in the financial statement, attached hereto, our income during the past year has amounted to \$2,500 in grants, together with a balance of \$545.51 received from the retiring secretary, making a total income of \$3,044.83.

*Receipts.*

1911—Cheque from Alberta Government.	\$1,000	00
Account transferred from Lethbridge by retiring secretary.	545	51
Cancellation cheque No. 7, grant to retiring secretary, covered by local cheque prior to transfer of account.	250	00
1912—Dominion Government grant.	500	00
Cheque from British Columbia Government on account grant.	1,000	00
" " " "	1,000	00

1911—Special train to Bassano, entertainment and expenses relating thereto. . . . .	\$ 260 28
Printing, badges, programmes, &c., in connection with 1911 convention, Calgary. . . . .	109 10
Rent of hall, expense transportation speakers, moving picture machine and operator. . . . .	67 55
Stenographic reports. . . . .	197 30
Grant to permanent secretary (retiring). . . . .	250 00
Travelling expenses, secretary and representative, to attend National Irrigation Congress, Chicago; travelling expenses, secretary, Kelowna, Sicamous, Kelowna, Lethbridge, and Edmonton, during the year. . . . .	268 60
Old telegraph account. . . . .	2 21
Membership fee, National Irrigation Congress. . . . .	10 00
1912—Printing programmes, official calls, constitutions, stationery, during year. . . . .	162 10
Engraving of cuts for illustrations. . . . .	62 40
Badges for 1912 convention, and fobs. . . . .	82 00
Draft to local secretary for entertainment, Kelowna convention—to be accounted for. . . . .	500 00
Exchange on drafts. . . . .	68
Secretary's salary for year. . . . .	300 00
Drawn for emergencies, to be accounted for. . . . .	100 00
Balance in bank. . . . .	1,923 29
	<hr/>
	\$4,295 51    \$4,295 51

(Signed) NORMAN S. RANKIN,  
*Permanent Secretary.*  
 (Applause.)

30493—4½



MR. CHAIRMAN, LADIES AND GENTLEMEN.—I represent the Province of British Columbia, which has been referred to by my friend, Mr. Campbell, an earlier speaker on this afternoon's programme. I am also a member of the Western Canada Irrigation Association; my modesty permits me to say that I am president of it, but that arises more from the position which I have held than from any personal qualifications which I possess for that high office.

Now, Mr. Chairman, ladies and gentlemen, since the commencement of this irrigation congress I have been rather puzzled to answer the question to myself, 'Why am I here,' because I entertained the idea that to those of us who are perhaps young and more active, some task would be put to our hands to perform. But I was not called upon, and therefore I have permitted myself to enjoy to its limit the far famed hospitality of the city of Chicago.

I was also further discouraged by the fact that I have a very intimate friend here in the city of Chicago who lived in our Province of British Columbia for a number of years. He lived in the coal mining section of the province at the same time I did, and I had the privilege of having dinner with him last night, when he said to me: 'Ross, why are you here?' 'Oh,' I said, 'I am a delegate to the Irrigation Congress.' 'Well,' he replied, 'I lived in British Columbia for two years, and the only thing I knew there that needed irrigating was dry throats.' (Laughter.)

I felt rather discouraged that I should get this answer from my friend. However, if I may be permitted to say a word or two, and I promise you this paper in my hand is not really as long as it looks, I would like to claim your attention for a few minutes with reference particularly to the Province of British Columbia, and what has been going on there in the way of development of irrigation from its legislative standpoint, and also from its practical application.

In the year 1897, legislation dealing with irrigation was placed on the statute books of the Province of British Columbia. As was inevitable at that comparatively early stage in the development of the Canadian West, this legislation was of slight and imperfect nature, and though it did a great deal in the way of reducing to order the existing chaos, it did not really cope with the great danger of litigation, that is the bugbear of all water administration. In those days the population of the province was to a very large extent composed of the floating element that mining booms attract to a new country, and even the census taken three years later only revealed a white population of scarcely over 150,000, scattered throughout a territory 700 miles long by 400 miles wide.

About 1905, however, a very noticeable change began to be perceptible throughout the province. The great influx into the farming regions of the prairie country created a new demand for the products of British Columbia—for our timber and fruits most particularly. The forest policy of the Provincial Government that threw open 15,000 square miles of merchantable forest to the investor upon a remarkable and, I venture to think, masterly basis of partnership between the investor and the Crown, was bringing an immense amount of outside capital into the province; in consequence of this our other natural resources were beginning to attract attention; there had arisen the heavy demand for agricultural land that has been perhaps the most striking feature of our recent history (so much so that our annual receipts from the sale of land exceed two and a half million dollars, and our surveyors have for

years been far in arrears with their work); and on top of this inevitably the value of our water supply was becoming apparent, and applications to record water were beginning to pile up in the public offices until the most painful complications in the way of litigation threatened to arise. In fact, the modern struggle for water had begun in the province.

It was under these circumstances that the government in 1907 hastened to appoint a commission of investigation, composed of Professor Carpenter and Mr. Fulton, the Chief Commissioner of Lands. The commission devoted particular study to the progress made in water administration in Colorado, where natural conditions similar in many ways to those of British Columbia had been dealt with; and it soon reported that immediate revision of our provincial legislation was required. The necessary changes were defined to be:—

1. A recognition of the right to store water in reservoirs, to expropriate land for that purpose, and to carry water through natural streams.
2. The investigation and disposal of the excess records that already had come into existence on many streams.
3. The establishment of a definite official administration of water under control of a competent board.

At the beginning of 1909, a most comprehensive Water Act was therefore passed by the legislature, the main principle of which was the granting of the right to water on its beneficial use, the old Act not having gone far enough in this direction. A board of investigation was appointed to take in hand the collection of all necessary data, and to this board was given the duty of adjudicating on claims, an appeal being allowed from its decisions to the courts of the land. This board is supported by an annual vote of \$76,640.

From the oratorical point of view I much regret, gentlemen, that the mass of data already accumulated and being added to every day concerning both recorded and unrecorded water available for irrigation and power in the various districts of the province—I much regret that this data is still in the uninteresting condition that precedes the stage when fascinating statistical computations have been extracted from it to charm the ear of congresses. So I cannot face you like the president of a western board of trade with a bristling array of facts and figures in support of my general remarks. I can only say that an enormous number of applications for water have been and are being made to my board, irrigation projects are under way in almost every portion of the southern section of our province and the utilization of water-power is making the most gratifying progress, though only about 160,000 horse-power has been developed out of some 2,000,000 estimated horse-power.

## EXISTING POWERS.

Location.	Estimated possible Horse-power.	Horse-power developed and by whom developed.
Bonnington Falls.....	275,000	40,000 West Kootenay Power Co.
Stave River.....	60,000	25,000 Western Can. Power Co.
Lake Buntzen.....	60,000	33,000 Vancouver Power Co.
Cascade (Kettle River).....	7,000	3,000 Cascade Waterpower Co.
North-Fork Kettle River.....	1,500	1,100 Granby Smelter.
Goldstream (V. I.).....	5,000	3,000 Esquimalt Waterworks Co.
Jordon River.....	24,000	10,000 Vancouver Island Power Co.
Rainy River.....	10,000	8,000 David Investment Co.
Quatsino.....	25,000	8,000 David Investment Co.
Ocean Falls.....	25,000	8,000 Ocean Falls Co., Ltd.
Swanson Bay.....	10,000	
Powell River.....	40,000	20,000
Elk River.....	15,000	
Campbell River.....	100,000	
Nimkish River.....	20,000	
Other powers (estimated).....	1,500,000	

Concerning southern British Columbia, expert reports show that practically all the valleys and bench land at less than 2,000 feet elevation may be turned into productive land of high value by the application of water, and, since this country possesses a large number of small mountain streams, the area thus developed will even in the immediate future amount to several hundred thousand acres. Southern British Columbia is, in fact, destined to be an extensive area of high-priced irrigated land, to quote Professor Carpenter's report; and, since the growing of fruit is our specialty and the irrigation of fruit lands is needed in particular at that season of the year when the mountain streams are apt to be low, the future of our development in this direction is seen to depend in a very obvious manner upon the adequate storage of water.

During the last six years the province has attracted a large immigration, so much so that the population has doubled and is now placed by the census at 350,000 persons. One natural feature of this sudden increase has been the excessive growth of our cities, two of them, Vancouver and Victoria, containing between them about half the population of the province. This, of course, is a mere temporary symptom of progress, for in a country where irrigation in the southern region, heavy clearing in the coast sections, and the building of railways in the huge expanse of the central and northern regions must precede agricultural development, it is natural for a time that the growth of cities should be out of proportion to the growth of agriculture. So it comes that rather more than half our consumption of agricultural produce must be imported, even though our home production has risen rapidly in value to over \$14,000,000 annually. The situation revealed by these facts shows in a striking manner both the need and the great field for profitable irrigation.

In the matter of administration, gentlemen, I judge that we stand in a much easier position than do many of the states of the Union, not only on account of the large financial surplus (about two and a half millions) that our finance minister has to administer each year, but chiefly for the simple reason that far greater power is vested in the provincial executive than that to which you are accustomed in the States. Because of this power we are able to act quickly and meet the needs of any situation as it arises; there are no cumbrous delays. I can illustrate this freedom

of action by what we have done to protect the watersheds and forest growth upon which the maintenance of our water supply so much depends. We began by spending about \$44,000 on the extinguishing of forest fires in 1909; to meet the disastrous emergencies last year we jumped the expenditure to \$218,000; this year we elaborated our forest protection service and sought to prevent fires instead of confining ourselves to fighting conflagrations that had been allowed to gain headway, and we are now busy upon the creation of a system of forest protection that will, I venture to think, improve upon anything so far attempted upon so large a scale by any government in the suppression of the fire menace. Our forests, our water-supply and our agriculture shall be no longer at the mercy of catastrophes caused by carelessness and neglect. (Applause.)

As this was the first occasion that the Western Canada Irrigation Association had sent a delegation to the National Irrigation Congress, the following address was prepared, and read at the banquet to the foreign delegates held in the La Salle Hotel on the evening of December 7, 1912:—

The Western Canada Irrigation Association, upon this very important occasion to us of our first official attendance at the National Irrigation Congress, cannot let the occasion pass without expressing to the congress as a whole, and to the Foreign Committee in particular, our hearty appreciation of the extreme kindness and courtesy which have been extended to us since our arrival in your city, and the plans which have been made for our entertainment.

We feel that we are welcome, and that at future congresses, in which we hope to have the honour of participating, we will again find ourselves amongst the many friends whom through the splendid programme of the Foreign Committee we have been enabled to make. Our association is young in years, but vigorous in action and endeavour, and that we may know each other better and co-operate in those things which may be of mutual benefit to us, we herewith extend you a cordial invitation to send a delegation to the next annual convention of the Western Canada Irrigation Association, which will be held at Kelowna, British Columbia, some time in the early part of the month of August.

We express our thanks to the Chairman of the Chicago Board of Control, the Honourable R. R. McCormick; to Mr. Park, Vice-President, Illinois Central Railway; to Dr. W. A. Evans, Chairman of the Committee of Foreign Delegates; to our good friend, Dr. E. McQueen Gray, Foreign Secretary; and to all the other individuals or associations to whom we are indebted for entertainment or attention.

On account of the excessive hospitality of which we have been the object, our participation has been impossible on all occasions, and we only trust that the National Irrigation Congress will accept our sincere invitation to take part in our Kelowna convention, and allow us in some small measure to return the many kindnesses received at your hands.

We have the honour to inscribe ourselves.

(Signed) W. R. ROSS, *President.*

NORMAN S. RANKIN, *Secretary.*

W. H. FAIRFIELD, *Delegate.*

H. J. CARDELL, *Delegate.*

HERBERT VANDERHOOF, *Editor,*

*'Canada Monthly' Magazine.*



Both the Honourable Mr. Ross's speech and the resolution before quoted were reproduced in the 1911 Official Report of the National Irrigation Congress.

During the convention, endeavour was made through publicity connections at Chicago to get as much notice as possible in local and United States papers, and we were fairly successful. I will not burden this report with the reproduction of more than one or two such articles, and do so only that you may know the character of the publicity that we were able to secure. The balance of publicity regarding the association and its affairs in newspaper clippings have been bound together and placed in the hands of the Executive Committee. The two I refer to are of more than usual interest, and are, therefore, included in this report.

*From the 'Chicago Record-Herald,' December 7, 1911.*

### DISCUSS EXODUS TO CANADA.

'James A. Frear, Secretary of State for Wisconsin, started an argument on the floor of the convention when he asserted that more than 200,000 American farmers are annually removing to Canada, enticed there in many cases by fraudulent statements of land agents. Mr. Moody, of Spokane, Wash., jumped to his feet in protest. "The American farmer has a right to go to Canada if he wants to," he shouted. "If he can go up there and make a fortune he would be a fool to miss the opportunity. As to sand-lot advertising schemes, there are more of them in Chicago than in the whole of Canada."'

This gave opportunity for Canadian representatives to interpolate that neither the Canadian Government agents nor the representatives of the great railways could in any way misrepresent facts, and illustration of the case was cited of a Canadian Government agent in one of the large American cities giving certain figures to the press regarding emigration to Canada, which upon investigation were found to be incorrect. Although the agent was able to convince the Canadian Government absolutely of his innocence of the charge of misrepresentation of facts (he having quoted from his books in haste one set of figures for another), nevertheless he was relieved of his duties at once. This information was telegraphed immediately to the Canadian press at Montreal, Winnipeg, Calgary and other centres.

The following is a telegraphic publicity draft of the opening day's session, which in this form was forwarded daily to Canadian press centres:—

'The following telegram is for distribution in Canadian and local papers: Official recognition has been made by the National Irrigation Congress now in session here to the visiting delegation of the Western Canada Irrigation Association, and to-day the Honourable W. R. Ross, Minister of Lands for British Columbia, and President of the Western Canada Irrigation Association, addressed the convention at length. He was followed by R. H. Campbell, Director of the Forestry and Irrigation Branches of the Department of the Interior at Ottawa, while a representative of the Canadian Government, in the person of F. H. Peters, of Calgary, and W. H. Day, attached to the Guelph Agricultural College, concluded the afternoon session. The foreign delegates, among whom were included the Western Canada Irrigation Association representation, occupied seats on the platform this afternoon during the proceedings.

At a luncheon given by the Chicago Association of Commerce in the La Salle Hotel to-day, the opening reply to the address of welcome was given by the Honourable Mr. Ross. In addition to the above mentioned delegates from Canada, the Western Canada Irrigation Association is represented by H. J. Cardell, of the Canadian Pacific Irrigation and Colonization Company, W. H. Fairfield, Superintendent of the Dominion Experimental Farm at Lethbridge, and Norman S. Rankin, Permanent Secretary. This is the first occasion that the Western Canada Irrigation Association has sent a delegation to the National Irrigation Congress, and the delegates are in receipt of many kindnesses and courtesies from the officials of the congress, who have been invited to send a delegation to the next Canadian convention to be held during the coming summer at Kelowna, British Columbia. A banquet to the foreign delegation is to take place to-morrow night at the La Salle Hotel.'

In order that the Dry Farming Congress should not feel that the irrigation interests were not with them, your secretary addressed a communication to Executive Secretary-Treasurer John T. Burns, offering to assist in securing publicity for that congress in every possible way, which has been done by distributing their news items through western Canada and across the line. This letter was read before the Executive Council of the Dry Farming Congress, who passed a vote of thanks to the Western Canada Irrigation Association, and accepted the offer with enthusiasm. It was at this time that an invitation was extended to Mr. Burns to be present at the Kelowna convention, which he intimated he would have pleasure in doing.

I believe Mr. Burns is with us to-day, and I am sure we will have much pleasure in listening to what he has to say, even if he does not talk on irrigation but upholds the benefits of dry farming methods.

The following is the correspondence between Mr. Burns and your secretary:—

Letter to J. T. Burns, Executive Secretary-Treasurer, International Dry Farming Congress, Lethbridge, from the secretary, under date of January 29:—

DEAR SIR,—It gave me much pleasure on Saturday to make your acquaintance, and I wish now to reiterate our invitation to yourself to be present at the sixth annual convention of the Western Canada Irrigation Association, to be held at Kelowna, B.C., early next August. You may address the convention on the subject of your Dry Farming Congress, if you so desire.

Yours very truly,

(Signed) NORMAN S. RANKIN,

*Secretary.*

Letter from John T. Burns, Executive Secretary-treasurer, International Dry Farming Congress, Lethbridge, to the secretary, under date of January 6:—

DEAR MR. RANKIN,—At the meeting of the Executive of the Canadian Board of Control yesterday, your letter was read and was most enthusiastically received. A resolution of thanks for your most helpful offer to assist us in publicity work was passed.

I shall attempt to do very little until the arrival of Mr. Finley, our publicity man, next week, and it is quite likely that he will run up to Calgary to interview you in regard to the details of our work soon after he arrives.

Yours very truly,

(Signed) JOHN T. BURNS.

The Hon. T. W. Patterson, Lieut.-Governor of British Columbia, to the secretary, under date of August 30, 1912, signified his acceptance of the office of Honorary President in the following letter:—

SIR,—I am directed by His Honour the Lieutenant-Governor, to acknowledge the receipt of your letter of the 25th instant, and to express the pleasure it affords His Honour to accept the position of Honorary President of the Western Canadian Irrigation Association.

I have the honour to be, sir,

Your obedient servant,

(Signed) H. J. T. MUSKETT,

*Private Secretary.*

Mr. Maxwell Smith, Editor of the *Fruit Magazine*, Vancouver, reproduced in his valuable monthly publication most of the addresses given at the Calgary convention illustrating them attractively, and several engineering, Canadian, English and American journals published papers from our report.

You will have noted from the resolution of appreciation of our treatment at the hands of the Foreign Committee, which was read at the banquet to the foreign delegation in Chicago, that invitation was extended to the National Irrigation Congress to send a delegation to the Kelowna convention of this association and, of course the official call was sent to them.

Your secretary has become a permanent delegate of the National Irrigation Congress.

On June 15, 2,000 invitations were sent to our private mailing lists, newspapers, agricultural journals, boards of trade and municipalities in the three western provinces. This was supplemented by the issue of three specially prepared, illustrated, follow-up post cards, mailed at intervals of every ten days thereafter. A steady publicity campaign has been waged throughout the western press and magazines, while in the issue of a small publication edited by your secretary at Calgary, matter regarding the association's affairs has been carried weekly into practically every state in the Union, in addition to eastern Canada and Great Britain. Besides this, Local Secretary Dickson for the past two months has devoted a large part of his time to supplying the press of British Columbia with data regarding the Okanagan valley and this convention. Some of the speakers last evening were kind enough to refer to the work that I had done to promote the interests of the association and in bringing this record gathering and attendance here, and while I cannot deny that I have worked hard and enthusiastically towards this end, I do not wish to let the opportunity pass to give credit where credit is due. A man is only as strong as his lieutenants or assistants, and in having associated with me, as local secretary, Dr. C. W. Dickson, we secured an able lieutenant to whom is due much credit. As an active and able assistant and publicity agent, I want no better co-operator than the doctor, and congratulate Kelowna in having so energetic a citizen in your midst and our association in securing the benefit of his activity and ability. (Applause.)

The visit of your delegation to the National Irrigation Congress has been a step in the right direction, and I take this occasion to urge upon the convention the advisability of continuing the practice, and of appointing during this convention a committee to attend the Twentieth National Irrigation Congress which will be held



Mr. Fox's Orchard, Kelowna Land Orchard Bench, Kelowna, B.C.



this year at Salt Lake City during the latter days of September and the beginning of October.

Letter to J. A. Breitenstein, Secretary, Chamber of Commerce, Missoula, Montana, from the secretary, under date of January 26:—

DEAR SIR,—The sixth annual convention of this association will take place at Kelowna, B.C., at the beginning of next August. We are expecting a very enthusiastic convention attended by many prominent irrigation and soil experts. In the connection I write to ask if you would care to be our guest at this convention and address the delegates on the subject of fruit culture.

We expect that Professor Atkinson, from the State Agricultural College at Bozeman, will be present, as well as the Foreign Secretary of the National Irrigation Congress, and many others. The convention generally lasts three days, part of which time is given over to the entertainment of the visitors by the local societies.

Yours very truly,

(Signed) NORMAN S. RANKIN.

Letter from J. A. Breitenstein, Secretary, Chamber of Commerce, Missoula, Montana, to the secretary, dated February 1:—

MY DEAR SIR,—Thank you indeed for your splendid invitation of January 26 to address the delegates of the Western Canada Irrigation Association during their sixth annual convention, on fruit culture. I do not think myself proficient enough to give an address on this particular subject, but, if it is not impolite, would like to suggest a man from this state whom I know would give excellent satisfaction: this is Mr. M. L. Dean, State Horticulturist, a man of pleasing address and one who has been identified with fruit culture for the past twelve years. He was formerly connected with the Horticultural Department of the State Institute of Michigan, and is prominent in fruit circles in the Northwest. Last month he attended and addressed the Washington State Horticulture Society, and last fall accompanied our State Horticulture exhibit to New York, where we had a large and comprehensive exhibit of Montana products. I am sure Mr. Dean would not expect any charge for his services, outside the usual transportation and hotel expenses, which you intimate you would be willing to take care of. A letter will reach Mr. Dean at this city, and should you wish him to go it may be that I could arrange to accompany him as a visitor, as I am anxious to see all the natural resources of Canada, and especially interested am I in the fruit culture of your country.

The Board of Directors of this organization wish to thank you officially for extending an invitation to one of their directors to participate in the convention, as we appreciate the honour very much.

Yours truly,

(Signed) A. J. BREITENSTEIN.

Letter to the Hon. Duncan Marshall, Minister of Agriculture, Edmonton, from the secretary, under date of August 25:—

DEAR SIR,—At the fifth annual convention of the Western Canada Irrigation Association, held in this city, August 9, 10 and 11, it was resolved that a vote of thanks be forwarded to the Provincial Government for the very generous grant made to this association.

Which resolution I herewith transmit to you for the information of your government.

I have the honour to be,

Yours respectfully,

(Signed) NORMAN S. RANKIN.

Letter from the Hon. Duncan Marshall, Minister of Agriculture, Edmonton, to the secretary, under date of September 2:—

DEAR SIR,—Your resolution regarding vote of thanks received.

Yours very truly,

(Signed) DUNCAN MARSHALL.

Letter to the Hon. Frank Oliver, Minister of the Interior, Ottawa, from the secretary, under date of August 25:—

DEAR SIR,—At the fifth annual convention of the Western Canada Irrigation Association, held in Calgary, August 9, 10 and 11 last, it was resolved that a vote of thanks be extended to the Dominion Government for the annual publication of this association's reports.

Which resolution I now have the honour to transmit to you.

Yours respectfully,

(Signed) NORMAN S. RANKIN.

The Dominion Government again published our annual report, Mr. E. F. Drake, of the Department of the Interior, supervising it. The report this year presents an attractive appearance; it caused considerable comment on the part of the delegates to the Nineteenth National Irrigation Congress, to whom it was presented. Mr. Drake was requested to rush the publication of the report in time to have it distributed at the Chicago congress, in session, which he was able to do, shipping 500 to that city. This is some months previous to its issue in all other years, but we hope this year to even better that record.

Copies were sent direct from the government printers, Ottawa, early in November, to all delegates present at last year's convention, while upon my return from Chicago, copies were forwarded to all interested parties. Two thousand in all were distributed, with call for a very much larger number than we were able to supply.

A hundred odd copies were reserved to bring to this meeting for reference, and they will be found spread upon the chairs. I think we should request the government to increase publication to not less than 3,000 copies this year, as all will be called for.

Letter from the secretary, to E. F. Drake, Irrigation Branch, Department of the Interior, Ottawa, under date of December 11:—

DEAR MR. DRAKE,—Just a line to tell you that I have received the five hundred irrigation reports which you so kindly forwarded to me in Chicago for the convention. It will please you to know that these reports made a decided hit, and many complimentary expressions were made regarding their appearance and style. I passed these expressions on to you, as to you they really belong. The five hundred copies went out in one day and the demand for them was such that we could have disposed of five hundred additional copies had they been on hand.

Thanking you for your attention in sending them, and referring you to Mr. Campbell, who will tell you of the success of our representation, I am,

Very truly yours,

(Signed) NORMAN S. RANKIN.

Your secretary had the good fortune to be in attendance at the American Land and Irrigation Exposition in Madison Square Gardens, New York, last November, where many splendid exhibits were displayed. There was forwarded to the Execu-

tive Committee the official programme, with the following letter regarding the irrigation exhibits:—

GENTLEMEN,—Under separate cover I am sending you to-day copy of official programme of the American Land and Irrigation Exposition now going on at Madison Square Gardens in this city, and would draw your attention to the fact that Canada has three exhibits in connection therewith.

Canada was permitted to enter only three competitions: wheat, potatoes and apples. Out of these three, she carried off two of the prizes, and in the wheat competition, which carries with it the championship of the continent, three of Canada's entries preceded all others: Seager Wheeler, of Rosthern, Saskatchewan, first, W. J. Glass, of Macleod, Alberta, second, and Thomas Maynard, Deloraine, Manitoba, third, and, while this is not of particular interest to students of irrigation, yet that the three prairie provinces should have raised better wheat than any state in the Union is knowledge, I think, that every one interested in agriculture should know. (Applause.)

British Columbia carried off the prize for potatoes, Messrs. Asahel Smith and Dr. Wade being in charge. These potatoes were superior in every way to the second entry, which came from St. Louis, Minnesota. (Applause.)

The C. P. I. C. Co. exhibited two miniature fields of hay and grain under actual irrigation, which proved of great interest, and thousands stopped to ask regarding it. Accompanying this exhibit was a huge map bird's-eye-view of the C.P.R. Irrigation Block, showing the country from the Rocky mountains on the west to Medicine Hat on the east, and from Edmonton on the north to High River on the south. This map, together with thousands of little pamphlets on irrigation which are daily being given away, is bringing to the attention of the eastern public the benefits to be derived from irrigation and the position in the irrigation world that western Canada occupies.

Yours very truly,

(Signed) NORMAN S. RANKIN.

Shortly after my appointment to the position of permanent secretary, I was asked for a copy of the constitution of the association, but was unable to find one either on the files or in the possession of any of the present or retired officers. In the latter part of December, therefore, a new constitution was drafted up which met with the approval of the executive, and which was immediately forwarded to our mailing list.

Article VII, Membership, is based upon the original basis of representation which was drawn up at the formation of the association six years ago. You will note just under the title on the front cover, there is included in brackets the words '(Subject to revision at the Kelowna convention),' in order that this meeting may take up and deal with any changes or amendments if it so desires.

It is said that, while it is generally understood that any one who is an irrigator or farmer could attend the convention, and take part in the proceedings, it is not quite clear in the constitution, and if this can be remedied, without opening the way for irresponsible people, it should be done.

Also, in accordance with the original basis of representation, the Dominion Commissioners of Irrigation at various points are the only members of irrigation staffs at these points recognized by the convention as members of the association, and since the formation of the association, a Commissioner of Forestry has been appointed by the British Columbia Government.

For the convenience of all, a copy of the constitution will be found on the seats.

It is with regret that we have to chronicle the death during the year of two members of the association, that of John T. Hall, former secretary, and the very recent demise of Mr. R. H. Agur, Second Vice-president, which occurred at Summerland, B.C.

During the past season, Mr. E. M. Carruthers, member of the executive at Kelowna, resigned, owing to his leaving for the old country. He was replaced by Mr. Thomas Bulman, a director of the British Columbia Fruit Growers' Association.

The following is Mr. Carruthers' letter of resignation:—

DEAR SIR,—I regret to say I am obliged to resign membership of the Western Canada Irrigation Association, owing to my leaving for the old country almost immediately. I beg to suggest Mr. F. E. R. Wollaston, of Kelowna, B.C., be elected in my place, as being a man in every way suitable. I am,

Yours very truly,

(Signed) E. M. CARRUTHERS.

Letter to the Executive, Western Canada Irrigation Association, from the secretary, under date of January 24:—

DEAR SIR,—I beg to advise you of the resignation from the Executive Committee of this association, of Mr. E. M. Carruthers, of Kelowna, B.C., owing to his leaving for the old country. It is important that we have a strong man at Kelowna, owing to the fact that the convention is going to take place there this year, and before asking for a vote as to the new appointee, I would like to visit Kelowna and look over the ground, which I hope to do within the next couple of weeks. I will communicate with you again immediately this visit is made.

Yours very truly,

(Signed) NORMAN S. RANKIN.

I append for reproduction in our annual report, Mr. N. E. Webster's paper on Irrigation Finance, delivered before the National Irrigation Congress at Chicago, last December. Mr. Webster was invited to read a paper at this convention and hoped to be present, but unfortunately has been unable to attend.

## IRRIGATION FINANCE.

By NORMAN E. WEBSTER, JR., Certified Public Accountant.

MR. PRESIDENT AND DELEGATES.—The fact that my place finds itself on a morning when a part of yesterday's programme has been pushed over, and when following me there is the name of a very popular speaker—all of this makes it exceedingly fortunate that I have tried to touch upon only the prominent points of this subject, and will leave the filling for discussion, if there is such, or for you to supply from your own information, as it affects your own situations.

Two years ago the magazines carried numerous advertisements of irrigation bonds. Circulars describing such issues were sent regularly to possible investors, and the subject of irrigation was a popular one for descriptive articles in the daily and periodical press. But conditions have greatly changed. The advertising has ceased, though bond houses feared the word irrigation, while the total of the reading articles is only a fraction of that we had the year before last. As an explanation for this



situation, it is suggested that the entire industry, including those projects which sound from every point of view, is suffering because of the misdeeds of those who were unsound; that the public now looks askance at all irrigation securities because some of them have been found to rest upon an impossible plan.

It is true that from physical causes some schemes have been doomed to failure from the start. Shortage of water (whether from naturally low flow, or prior appropriation), undesirability of land (whether because of soil quality, topography, elevation or inaccessibility), engineering defects in plan (whether of attempting to run water uphill, or placing structures in contravention of nature's permits), lack of business judgment in forecasting costs of construction and probable time completion—these and probably other causes have contributed to the non-success of some projects as they or similar causes have been the undoing of schemes on other lines of development.

Irrigation has no monopoly of failure. Nearly every other line of development has had its hard sledding. Railways, both steam and electric, and public utilities of all kinds have gone through such times of trial, until now their securities are among the standard investments; and even mining, which for a time apparently sought for its own every condemnatory feature of finance, has to a large degree shaken off this weight of a bad name and emerged as a reputable industry. Can irrigation do likewise? Is time alone to prove its saviour, or is something else necessary in order to place it on a solid foundation of public confidence?

Classifying broadly, there are three conditions which must be met in order to make a proposed scheme of irrigation a success: first, an available supply of unappropriated water so situated that it may be carried to cultivatable lands which are not available for agriculture except by the artificial application of water; second, a practical engineering plan for the carriage of the water to the land and its distribution thereon, so worked out that it makes reasonably sure that the system may be relied upon as permanent and able to fulfil year by year the purposes for which it was developed; and, third, capital for the undertaking sufficient to complete it in good order, and at the same time, assured of ultimate returns with interest for the period during which it has been tied up, and with additional profits that will properly compensate such capital for the risks taken.

I do not wish any one to think that I would suggest that these profits should be small. Certainly, in the present stage of the irrigation industry they should be large. The risks taken are unusual, and there is always a chance of failure from any one of numerous causes beyond the control of man and which could not be foreseen based on the information available in advance.

For after all the study that has been given to the matter of the country's water supply, the data in regard to precipitation and stream-flow in many places is meagre and does not cover a sufficiently long period to give an adequate forecast of what may be reasonably expected in the future, and, therefore, of what is necessary in the way of storage and regulation. At the same time, the difficulties inseparably connected with the construction of irrigation works are so great that those who undertake to cope with the forces of nature must plan against the possibility of great expense arising from events which could not be foreseen or adequately guarded against.

Irrigation work of the federal government offers examples of these two classes of physical difficulties. In New Mexico 'the canals of the Hondo project were ready

for operation in the spring of 1907, but since that date an unprecedented period of drought has existed and the flood waters of the Hondo river have been so small in quantity that but little use has been found for the reservoir.' This statement in the last annual report illustrates the effect on the project generally of insufficient data concerning the water-supply.

Again in Wyoming, the Pathfinder dam was built on the North Platte river to store water in a reservoir which was to be extended and partly inclosed by earth dykes. When the dam was well along, but before the embankments had been raised, an unprecedented rise in the river threatened to overtop the low reaches in the rim of the reservoir. Because of the consequent peril to the valley below it was considered necessary to prepare to dynamite the dam should the river actually reach the danger level, while at the same time the construction of the dykes was rushed as rapidly as possible. Unplanned-for work or planned work performed at rush speed always adds to the cost.

If, then, as we have seen, the uncertainty of the water-supply, and the possibility of unforeseen engineering difficulties are usually present in irrigation enterprises, it becomes even more important that the projects be freed if possible from other embarrassments, particularly those arising from unwise methods in financing and management. Especially is this true since it is probable that the public estimation of irrigation securities will always hinge more largely upon the degree of confidence reposed in its financial management than upon belief or knowledge of soundness in the technical matters of water-supply and engineering design.

Let us examine the financing of irrigation. I shall not attempt to describe the methods of all enterprises, nor claim that in detail the description will fit any particular promotion, but I shall hope to be fair to each by being fair to all in a description of general methods. And in so doing I will have in mind only those cases in which there is apparent the purpose to deal fairly by all concerned, with, of course, the legitimate and necessary fundamental that the enterprise shall produce in profits a handsome return to those who shall have put it through to successful completion.

The large irrigation developments have been financed almost exclusively by bond issues. One man or a group of men have found the necessary land and water and have acquired control thereof. They have then invested some money in engineering surveys and designs and often in some development work. When the project has been brought to the point where its general feasibility seemed reasonably well assured, a corporation was organized to take over the proposition. For the actual cash expenditures made by the original developers they have frequently been paid in bonds or in cash derived from the sale of bonds. For the intangible assets, often consisting of the control of the water and through it of the land, by means of water appropriations which, while not perfected and vested, are temporarily good and susceptible of perfection—for those tangible assets it has often been the practice to issue all the capital stock.

Thereafter the project has no means for raising money other than by sales of bonds until it shall have reached the stage when it can begin to realize on the sale of land or water-rights or both.

Up to the time of the bond issue the expenditures have been for preliminary surveys, designs and estimates; for the organization and promotion expenses and for the acquisition of lands and existing irrigation systems. After the time of the bond issue the expenditures will be for the final engineering, including, if properly completed, topographic and location surveys and structural design, for actual construction for general administrative and legal expense, for one or two years' expense of operation and maintenance, and for interest on the bond issue.

An examination of the requirements for these several classes of expense would most certainly disclose some interesting facts, but the information could be obtained only from the private books of account of the irrigation companies. We have, however, the published reports of the United States Reclamation Service, covering over thirty projects throughout the entire arid region. While the form of these reports is not quite that best suited for projects developed by private capital, a study of the figures seems to warrant these conclusions.

The expense of organization and promotion, together with the reimbursement of original promoters for their cash disbursements, may be estimated at ten per cent (10%) of the cost of construction. The general administrative expense during the construction period may be estimated at ten per cent (10%) of the cost of construction.

The duration of the construction period, counting from the organization of the company, may be estimated at from two to five years. The additional time after completion of the construction work for the delivery of water, before collections can be counted upon as a reliable income, will average two years. And as the money for construction must be provided in advance of expenditure requirements, an additional six months must be counted upon after bond sales before the funds are disbursed. These three elements of time indicate that the interest charges on the bonds during the construction period and two years of the operating period would, at six per cent (6%) amount to from twenty-one (21) to thirty per cent (30%) of the construction cost.

I have measured these items of expense in terms of construction cost because there is usually an engineering estimate of the construction cost, while there may be no estimate of the total cost including all other expense items.

From these figures we find that the three items of initial organization expense, general expense during construction and bond interest together entail an outlay of from forty-one (41) to fifty per cent (50%) of the construction cost.

Moreover, it should be noted that the interest charges, as computed herein, are only on the money necessary for construction, so that if the cash for all purposes is to be provided from the bond issue, the total issue must, at a minimum, exceed the actual cost of engineering and construction by from fifty (50) to sixty-five per cent (65%) according to whether the project will require from two to five years for building.

And further, these figures are based upon the sale of bonds at par. If, however, they net the company less than par, the amount of the discounts and commissions must be provided for by an increase of the foregoing excess over construction cost.

Having investigated the financial requirements of irrigation, let us examine the security it has to put behind its bonds. The trust deeds usually mortgage all of the

company's property, real and personal, both presently owned or thereafter acquired, as a collateral require the deposit of contracts for the sale of land or water-rights or both to the extent of from one hundred and twenty-five (125) to one hundred and fifty per cent (150%) of the amount of bonds issued, though this additional security is sometimes waived as to a portion of the issue.

Of course, these two classes of security are mutually exclusive, for, to the extent that each water-right contract disposes of a portion of the entire supply available for sale, it reduces the equity of the company in the physical property which it has produced. In the final analysis, the lien which the water-right contract gives on the land and water is the stronger security, but until the project is well along toward completion there is no assurance that this security will ever be perfected by providing the water which will give the land its possible value. Pending the time when completion is assured, the security rests wholly or mainly on the value of the property mortgaged, rather than on the land to be irrigated.

But if the funds for all purposes are derived from the bond issue, then, as we have seen, the other expenses, not including bond discounts and commissions, will require from fifty per cent (50%) to sixty-five per cent (65%) of that required for construction, so that, of the entire proceeds of such bond issues, only sixty-six and two-thirds per cent ( $66\frac{2}{3}\%$ ) to sixty per cent (60%) will be available for actual building operations. Such an investment in tangible property does not, of course, offer a real security for the bonds, the safety of which then rests on the successful completion of the enterprise. They then lose the element of security which should be a prerequisite for a bond and become preferred speculative investments in the whole project. And yet there is no way to improve the security behind the irrigation bond during the construction work, unless provision can be made whereby these general expenses, and especially the bond interest, are provided for otherwise than from the sale of bonds.

How then shall irrigation be financed in order that projects shall be equal to carrying interest and general expense until water-right contract collections are supplying an income sufficient to provide for such interest charges and a sinking fund for the bonds?

First, by a bond issue the proceeds of which shall be sufficient to provide for all construction and engineering, and for the purchase of lands and existing irrigation systems, and shall be restricted to such uses.

Second, by a preferred stock issue, the proceeds of which shall be sufficient to provide for the promotion and organization disbursements, the general administrative and legal expenses during construction and the bond interest until the latter is supplied from water-right contract collections.

Third, by a common stock issue for the intangible assets acquired from the original promoters.

By this method the bonds will at all times have as security construction work and available cash equal to one hundred per cent (100%) of the bond proceeds, while the water-right contracts deposited as collateral will be a better security than now, inasmuch as the investment by the preferred stockholder will give increased likelihood of the efficient and speedy completion of the construction work. The preferred stock should be preferred as to assets, and guaranteed a fair return for the period of



its investment, and might properly be subject to retirement under prescribed conditions after the collections were sufficient to provide both interest and sinking fund for the bonds.

When thus retired the further profits of the undertaking would, as now, be added to the common stock. The plan herein proposed does not at all affect the status of the present stock. It does, however, distinguish between the investment and speculative features of the present irrigation bond by providing that the speculative element shall be assumed by the preferred stock, thus leaving the bond with a security where it could well be styled an investment proposition.

Almost certainly the present depression in irrigation development is only temporary, and must eventually give way to renewed activity. And this will follow, not because promoters, bankers, engineers, contractors or even accountants desire it, but rather because the increased population and the popular demand for better living conditions combine to make it necessary that large additional areas be placed under cultivation.

It is nothing new to call attention to the fact that the land available for agriculture as formerly practiced is largely exhausted. In this statement, repeated often that it has become a platitude, is the hope of the irrigation industry. But as an important aid in putting irrigation on its feet again, a rehabilitation of its scheme of finance will play an important part.

#### CORRESPONDENCE, TELEGRAMS AND LETTERS OF REGRET AT INABILITY TO ATTEND.

(Telegram.)

VICTORIA, B.C., August 16, 1912.

Hon. W. R. Ross,  
Kelowna, B.C.

My best thanks for message conveyed through to-day from Western Canada Irrigation Convention. It is most gratifying to learn that gathering has been highly successful and largest in history of association. Undoubtedly results will prove most beneficial to British Columbia and western Canada.

R. McBRIDE.

GOVERNMENT HOUSE,

EDMONTON, ALBERTA, August 8, 1912.

N. S. RANKIN, Esq.,  
Secretary, Western Canada Irrigation Association,  
Calgary, Alta.

DEAR SIR,—I beg to acknowledge receipt of your letter of the 5th, conveying the request of the executive that I should be present at the Irrigation Convention at Kelowna on the 13th instant. I regret that on account of the near approach of the visit of Their Royal Highnesses and the necessity of making proper arrangements for their reception, I will be unable to go to Kelowna. Please convey my regrets to the members of your executive.

Very faithfully yours,

GEO. H. BULYEA,  
Lieutenant-Governor.

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Concrete-lined Canal of Kelowna Irrigation Company, Ltd., Covering 'Glenmore' Property of Central Okanagan Lands, Ltd.

AT



Showing Construction of Concrete-lined Canal of Kelowna Irrigation Company, Limited, Carries Water to Lands of Central Okanagan Lands, Ltd.

DEPARTMENT OF THE INTERIOR,

August 6, 1912.

(Winnipeg, Man.)

NORMAN S. RANKIN, Esq.,

Secretary, Western Canada Irrigation Association,  
Calgary, Alta.

MY DEAR SIR,—I regret exceedingly that I will be unable to be present with you at your convention on the 13th, 14th, 15th and 16th of this month. I have just received a request to return to Ottawa at once, which makes it impossible for me to be present on the dates named.

With all best wishes for a very successful meeting, believe me, I am,

Yours sincerely,

R. ROGERS,

*Minister of the Interior.*

EDMONTON, July 13, 1912.

CHARLES W. DICKSON, Esq.,

Local Secretary,  
Kelowna, B.C.

DEAR SIR,—I have your letter *re* Western Canada Irrigation Convention, and I hope to be able to attend, but during that week Edmonton exhibition is being held, and this may interfere with my going. However, I will endeavour to spend at least a day at your convention.

Yours very truly,

DUNCAN MARSHALL,

*Minister of Agriculture.*

DEPARTMENT OF AGRICULTURE,

MINISTER'S OFFICE, OTTAWA, June 20, 1912.

NORMAN S. RANKIN, Esq.,

Secretary, Western Canada Irrigation Association,  
Calgary, Alta.

DEAR SIR,—I am in receipt of your letter of the 14th instant, inclosing programme of your Irrigation Convention, for which please accept my thanks.

It would give me great pleasure to be present but I know that it will be impossible. I shall not be going west until early in September, as I have to make a trip through the Maritime Provinces before I leave for the west. It will, therefore, be out of the question for me to be present on the dates mentioned.

I am very much pleased to see that you have such an excellent programme, and I need hardly say that I wish your convention a most unqualified success.

Yours very truly,

M. BURRELL,

*Minister of Agriculture.*

DEPARTMENT OF AGRICULTURE,

REGINA, July 11, 1912.

CHAS. W. DICKSON, Esq.,

Local Secretary,  
Kelowna, B.C.

DEAR SIR,—I thank you for your invitation of the 1st instant to the Sixth Annual Convention of the Western Canada Irrigation Association. I regret that it will not

be possible for me to visit Kelowna on that occasion, but hope to have that pleasure a few weeks later.

Yours faithfully,  
A. F. MANTLE,  
*Deputy Minister.*

VICTORIA, B.C., July 9, 1912.

CHARLES W. DICKSON, Esq.,  
Local Secretary,  
Kelowna, B.C.

DEAR SIR,—In the absence of the Honourable Doctor Young, I beg to acknowledge the receipt of your letter of the 1st instant, extending him an invitation to attend the Sixth Annual Convention of the Western Canada Irrigation Association to be held in Kelowna on August 13 to 16.

Dr. Young is at present in England, and will not be back until after the date in question.

Thanking you on his behalf for the courtesy,

I am, yours faithfully,  
J. C. LOWE,  
*Private Secretary.*

VICTORIA, B.C., July 8, 1912.

CHAS. W. DICKSON, Esq.,  
Local Secretary,  
Kelowna, B.C.

DEAR SIR,—I beg to acknowledge receipt of your communication of the 1st instant extending me a cordial invitation to visit Kelowna during the convention of the Western Canada Irrigation Association, but regret to say that my engagements for August will not permit my being with you.

Yours truly,  
W. J. BOWSER,  
*Attorney-General.*

HOUSE OF COMMONS, OTTAWA,  
(Calgary). July 17, 1912,

NORMAN S. RANKIN, Esq.,  
Secretary, Western Canada Irrigation Association,  
Calgary, Alta.

MY DEAR MR. RANKIN,—I very much regret that owing to the fact that I am leaving to-morrow night for England I will not be able to attend the annual convention of your association.

I have been very much interested in the welfare of the association since its inception, and last year was the first meeting I was unable to attend.

I was pleased to have the opportunity of urging upon the Federal Government the making of an annual grant to the association, and I have reason to believe that the grant which you now have obtained will be continued for many years.

With best wishes for the success of the meeting at Kelowna, which I feel is assured, congratulating the association upon the great success which has been attained this year and trusting that if I can be of any service to the association at Ottawa you will be good enough to command me, believe me,

I am, yours faithfully,

RICHD. B. BENNETT.



OFFICE OF R. INSINGER, FIRST VICE-PRESIDENT,  
 TWENTIETH NATIONAL IRRIGATION CONGRESS,  
 SPOKANE, WASHINGTON, August 2, 1912.

NORMAN S. RANKIN, Esq.,  
 Secretary, Western Canada Irrigation Association,  
 Calgary, Alta.

DEAR SIR,—I have neglected to answer your favour of July 2, sending me a special invitation to your Sixth Annual Convention, August 13 to 16, at Kelowna, B.C. I was in hopes to be able to attend, but I now find it absolutely impossible to get away at that time. I thank you for your courtesy in the matter, and wish you all the success which you richly deserve.

I remain, yours sincerely,  
 R. INSINGER.

HEADQUARTERS, TWENTIETH NATIONAL IRRIGATION CONGRESS,  
 SALT LAKE CITY, UTAH, July 18, 1912.

DEAR SIR,—It gives me pleasure to acknowledge your invitation of July 1 to the president, officers and members of the Executive Committee of the National Irrigation Congress to attend your Sixth Annual Convention, August 13 to 16.

I shall take pleasure in communicating your invitation to our officers and Executive Committee, and hope that some of them at least may find it possible to attend.

For myself, your meeting comes so close upon ours here that I fear I will be tied down to Salt Lake City, looking after arrangements for our own meeting, so it does not look encouraging for me to plan to be with you.

We hope for some of your members to meet with us again this year as they did last.

Yours very truly,  
 ARTHUR HOOKER,  
*Secretary.*

EDMONTON, ALBERTA, August 10, 1912.

N. S. RANKIN, Esq.,  
 Calgary, Alta.

DEAR SIR,—Your kind invitation to attend the Sixth Annual Convention of the Western Canada Irrigation Association received.

I very much regret that the dates fixed rather conflict with important engagements next week, so that it will be impossible for me to attend.

With best wishes.

Yours very truly,  
 A. L. SIFTON,  
*Premier.*

Telegrams of regret were also received from Messrs. E. A. Cunningham, President of the Lethbridge Board of Trade, James White, Secretary, Commission of Conservation, of Ottawa, and P. H. Moore, Superintendent, Experimental Farm, Agassiz, B.C. Mr. Moore was to have addressed the convention, but at the last moment was prevented from coming. His paper, however, is included in the report.

Letters of regret were also received from Messrs. Charles W. Peterson, Calgary;

W. E. Hodges, Vancouver; J. W. Mitchell, Mayor of Calgary; James C. Kennedy, Vancouver; A. J. Breitenstein, Secretary, Chamber of Commerce, Missoula, and H. W. Brodie, General Passenger Agent, Vancouver.

LIST OF INVITATIONS TO ATTEND THE WESTERN CANADA IRRIGATION ASSOCIATION  
CONVENTION, 1912, SENT TO THE FOLLOWING.

NEWSPAPERS.

British Columbia—

The 'Pioneer and Mining Journal,' Phoenix.  
 The 'News,' Nelson.  
 The 'Colonist,' Victoria.  
 The 'Times,' Victoria.  
 The 'News,' Vernon.  
 The 'World,' Vancouver.  
 The 'Province,' Vancouver.  
 The 'Review,' Summerland.  
 The 'Times,' South Vancouver.  
 The 'Observer,' Salmon Arm.  
 The 'Miner,' Rossland.  
 The 'Mail Herald,' Revelstoke.  
 The 'News,' Queen Charlotte.  
 The 'Empire,' Prince Rupert.  
 The 'Press,' Penticton.  
 The 'Express,' North Vancouver.  
 The 'News,' New Westminster.  
 The 'British Columbian,' New Westminster.  
 The 'Herald,' Nanaimo.  
 The 'Free Press,' Nanaimo.  
 The 'Herald,' Merritt.  
 The 'Orchard City Record,' Kelowna.  
 The 'Courier and Okanagan Orchardist,' Kelowna.  
 The 'Kootenaiian,' Kaslo.  
 The 'Standard,' Kamloops.  
 The 'Inland Sentinel,' Kamloops.  
 The 'Gazette,' Grand Forks.  
 The 'Evening Sun,' Grand Forks.  
 The 'Tribune,' Fort George.  
 The 'Free Press,' Fernie.  
 The 'District Ledger,' Fernie.  
 The 'Prospector,' Cranbrook.  
 The 'Herald,' Cranbrook.  
 The 'Journal,' Ashcroft.  
 The 'Advertiser,' Armstrong.

Alberta—

The 'Free Press,' Taber.  
 The 'Strathmore and Bow Valley Standard,' Strathmore.  
 The 'Review,' Okotoks.  
 The 'News,' Nanton.  
 The 'Times,' Medicine Hat.  
 The 'News,' Medicine Hat.  
 The 'Pioneer,' Magrath.  
 The 'Advertiser,' Macleod.  
 The 'South Alberta Labour Bulletin Fortnightly,' Lethbridge.

Alberta.—*Concluded.*

The 'News,' Lethbridge.  
 The 'Herald,' Lethbridge.  
 The 'Times,' High River.  
 The 'Call,' Gleichen.  
 The 'Press,' Daysland.  
 The 'Review,' Claresholm.  
 The 'Journal,' Carstairs.  
 The 'Alberta Star,' Cardston.  
 The 'Canadian,' Camrose.  
 The 'News,' Bassano.

## Manitoba—

The 'Western Municipal News,' Winnipeg.  
 The 'Northwest Review,' Winnipeg.  
 The 'Grain Growers' Guide,' Winnipeg.  
 The 'Free Press and Prairie Farmer,' Winnipeg.  
 The 'Telegram,' Winnipeg.  
 The 'Farmers' Advocate and Home Journal,' Winnipeg.  
 The 'Commercial,' Winnipeg.  
 'Canadian Farm Implements,' Winnipeg.  
 'Bulman's Farm and Motor Magazine,' Winnipeg.

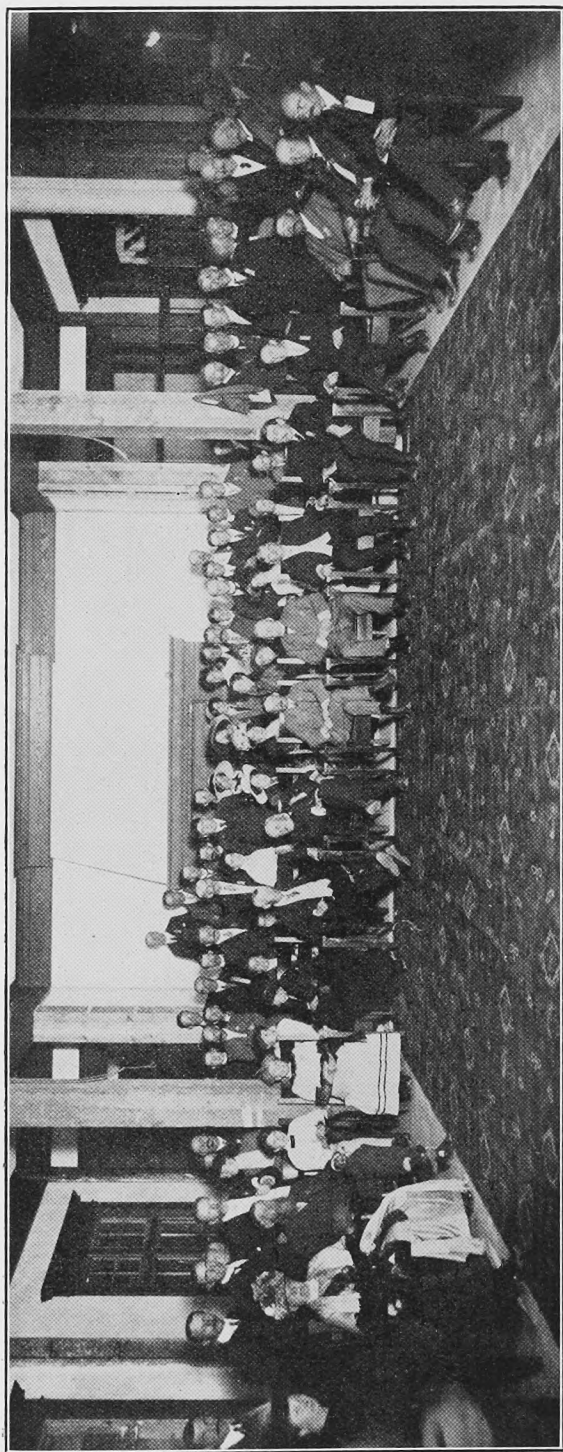
## Saskatchewan—

The 'Evening Star,' Saskatoon.  
 The 'Standard,' Regina.  
 The 'Saskatchewan Courier,' Regina.  
 The 'Morning Leader,' Regina.  
 The 'Leader,' Regina.  
 The 'Times,' Moosejaw.  
 The 'News,' Moosejaw.  
 The 'Evening Times,' Moosejaw.  
 The 'Leader,' Maple Creek.  
 The 'Advocate,' Manor.

## MAYORS, BOARDS OF TRADE AND AGRICULTURAL SOCIETIES OF

Regina, Sask.	Peachland, B.C.
Vancouver, B.C.	Summerland, B.C.
Vernon, B.C.	Victoria, B.C.
Penticton, B.C.	Revelstoke, B.C.
Macleod, Alta.	Magrath, Alta.
Medicine Hat, Alta.	Pincher Creek, Alta.
Raymond, Alta.	Red Deer, Alta.
Taber, Alta.	Calgary, Alta.
Ashcroft, B.C.	Armstrong, B.C.
Cranbrook, B.C.	Swift Current, Sask.
Kamloops, B.C.	Moosejaw, Sask.
Kaslo, B.C.	Maple Creek, Sask.
Kelowna, B.C.	Irvine, Sask.
Nelson, B.C.	Cardston, Alta.
Edmonton, Alta.	Gleichen, Alta.
Granum, Alta.	High River, Alta.
Lethbridge, Alta.	Brandon, Man.

and all government officials in the western provinces.



Flashlight Picture, Delegates at 'Incola' Hotel, Penticton.



## LIST OF DELEGATES ATTENDING THE 1912 CONVENTION.

Name.	Address.	Representing.
Thos. Alriel	Vernon, B.C.	Fruit Growers' Association.
A. E. Ashcroft	Kelowna, B.C.	Board of Trade.
W. E. Adams	Kelowna, B.C.	Central Okanagan Lands.
James Arnold	Calgary	City of Calgary.
Capt. W. McGee Armstrong	Vernon, B.C.	Municipality of Coldstream.
J. F. Armstrong	Victoria, B.C.	Chief Water Commissioner.
A. M. Bosman	Guelph, Ont.	Ontario Agricultural College.
F. H. Barnes	Enderby, B.C.	Enderby.
W. Brown	Westbank, B.C.	Westbank Irrigation Co.
Scott Blackwood	Kelowna, B.C.	Westbank Irrigation Co.
W. C. Blackwood	Kelowna, B.C.	
Capt. G. H. Brush	Kelowna, B.C.	Kelowna Land and Orchard Company.
E. Foley-Bennett	Penticton, B.C.	President, Board of Trade.
O. E. Butter	Regina, Sask.	Agricultural Industrial Exchange.
W. H. Brittain	Vernon, B.C.	Department of Agriculture.
Thomas Bulman	Kelowna, B.C.	Executive Committee.
John T. Burns	Lethbridge, Alta.	Dry Farming Congress.
Mrs. John T. Burns	Lethbridge, Alta.	Dry Farming Congress (Women's Section).
F. Barnard	Notch Hill, B.C.	Farmers' Institute.
R. J. Burley	Maple Creek, Sask.	Board of Trade.
F. D. Campbell	Hammond, B.C.	Hammond Fruit Association.
Thomas Cunningham	Vancouver, B.C.	Department of Agriculture.
D. R. Cameron	Kamloops, B.C.	Inspector Forest Reserves, Dom. For. Service.
R. H. Campbell	Ottawa, Ont.	Forestry Branch, Dept. of the Interior.
R. A. Copeland	Kelowna, B.C.	Kelowna.
Compton	Creston, B.C.	B.C. Fruit Growers.
C. H. Cordy	Summerland, B.C.	Board of Trade.
Allan Cameron	Calgary, Alta.	Superintendent of Lands, Land Branch, Canadian Pacific Department of Natural Resources.
R. B. Colley	Vancouver, B.C.	Commercial Review.
A. S. Dawson	Calgary, Alta.	Canadian Society of Civil Engineers.
C. R. Daniel	Lethbridge, Alta.	Agricultural Society.
P. DuMoulin	Kelowna, B.C.	Treasurer, W. C. I. Assn.
Dr. C. W. Dickson	"	Local Secretary of Association and representative of Kelowna City Council.
J. S. Dennis	Calgary, Alta.	First Vice-President.
J. C. Dufresne	Penticton, B.C.	Board of Trade.
E. Davis	Victoria, B.C.	Board of Investigation Irr., B.C.
H. Dunsdon	Summerland, B.C.	City Council.
Thomas Dale	"	"
James Duff	Calgary, Alta.	Townsite Branch, Canadian Pacific Department of Natural Resources.
M. L. Dean	Missoula, Montana.	Montana Horticultural Society.
F. M. Evans	Lethbridge, Alta.	A. R. and I. Co.
J. M. Empey	Calgary, Alta.	Board of Trade.
S. T. Elliott	Kelowna, B.C.	"
T. M. Evans	Lethbridge, Alta.	A. R. and I. Co.
P. H. Eraut	Penticton, B.C.	Municipality.
Prof. W. J. Elliott	Calgary, Alta.	Superintendent of Agriculture, Canadian Pacific Railway.
L. Fetherstonhaugh	Westbank, B.C.	Irrigation Company.
Dr. S. Fortier	Washington, D.C.	United States Department of Agriculture.
A. J. Fouracre	Westbank, B.C.	Farmers' Institute.
F. J. Fulton, K. C.	Kamloops, B.C.	Executive.
W. H. Fairfield	Lethbridge, Alta.	Superintendent, Government Experimental Farm.
W. S. Foggo	Vernon, B.C.	Municipality.
R. E. French	Salmon Arm, B.C.	Department of Agriculture.
Neil Gregory	Kelowna, B.C.	Poultry Association.
F. W. Groves	"	South Kelowna Land Co.
J. S. Gillespie	Naramata, B.C.	Summerland Development Co.
W. H. Grunsky	Portland, Oregon.	Irrigation Expert, Water Branch.
Charles Greer	Penticton, B.C.	Municipality.
Graham Gorrie	Kelowna, B.C.	C. C. Irrigation Company.
Dr. W. H. Geddes	"	Kelowna Irrigation Company.
M. Hereron	"	Farmers' Institute.
E. Hillian	Notch Hill, B.C.	"
R. T. Hickes	Nelson, B.C.	Fruit Growers' Union.
George Harcourt	Edmonton, Alta.	Deputy Minister of Agriculture, Alberta.
Prof. R. Harcourt	Guelph, Ont.	Ontario Agriculture College.

## LIST OF DELEGATES ATTENDING THE 1912 CONVENTION—Continued.

Name.	Address.	Representing.
G. Heggie	Vernon, B.C.	Board of Trade.
F. R. E. DeHart	Kelowna, B.C.	"
E. Henderson	Vernon, B.C.	Municipality of Coldstream.
G. C. R. Harvey	Okanagan Mission, B.C.	Okanagan Mission Farm and Orchard Company.
H. J. Haffner	Windermere, B.C.	Columbia Valley Irrigation Fruit Lands.
Ben Hay	Vernon, B.C.	Department of Agriculture.
James Johnston	Nelson, B.C.	Farmers' Institute.
G. C. Johnston	Vernon, B.C.	Board of Trade.
P. J. Jennings	Calgary, Alta.	Industrial Bureau, City of Calgary.
J. W. Jones	Kelowna, B.C.	Mayor of Kelowna.
Dr. Wansborough Jones	Okanagan Mission	Okanagan Mission Farm and Orchard Company.
C. L. Kane	Lethbridge, Alta.	Board of Trade.
M. E. B. Knight	Vernon, B.C.	White Valley Irrigation and Power Company.
James R. Kinghorn	Notch Hill, B.C.	Farmers' Institute.
C. E. Lawrence	Kamloops, B.C.	Board of Trade.
H. P. Lee	Vernon, B.C.	Wood Lake Fruit and Lands Company.
W. G. Guy Lindsay	Kelowna, B.C.	Canyon Creek Irrigation Company.
F. Lewis	Rutland, B.C.	Rutland Estate Irrigation Company.
R. Layritz	Victoria, B.C.	District of Saanich.
W. A. Lang	Peachland, B.C.	Board of Trade.
C. I. Lewis	Corvallis, Oregon	Govt. Experimental Station.
Norman P. Lambert	Calgary, Alta.	Toronto Globe.
A. R. Mitchell	Kelowna, B.C.	Kelowna Irrigation Company.
H. R. MacMillan	Victoria, B.C.	Chief Forester of B. C.
W. H. Moody	Kelowna, B.C.	C. C. Irrigation Company.
G. Murray	Armstrong, B.C.	Municipality of Spallumcheen.
M. S. Middleton	Nelson, B.C.	Department of Agriculture.
J. C. Metcalfe	Hammond, B.C.	B. C. Government Market Commission.
B. A. Moorhouse	Kelowna, B.C.	Central Okanagan Land and Orchard Company.
J. C. Milligan	Banff, Alta.	Resident Engineer, Parks Branch.
N. D. McTavish	Kelowna, B.C.	Central Okanagan Lands, Ltd.
H. H. McLeay	" "	" "
K. M. McKenzie	" "	Bankhead Orchard Company.
John McMillan	Rutland, B.C.	Rutland Estate Irrigation Company.
J. A. MacKelvie	Vernon, B.C.	Vernon News.
F. D. Nicholson	Salmon Arm, B.C.	Board of Trade.
P. L. Naismith	Calgary, Alta.	A. R. and I. Co.
F. C. Nunnick	Ottawa, Ont.	Commission of Conservation.
R. C. Pegler	Bassano, Alta.	President, Board of Trade.
W. R. Pooley	Kelowna, B.C.	Canyon Creek Irrigation Company.
G. M. Pierce	Bassano, Alta.	Board of Trade.
F. H. Peters	Calgary, Alta.	Commissioner of Irrigation, representing also Canadian Society of Civil Engineers.
J. L. Pridham	Kelowna, B.C.	Agricultural Journal Editor.
C. C. Prowse	" "	Okanagan Development and Orchard Company.
R. M. Palmer	Kamloops, B.C.	Kamloops Fruit Land, Irrigation and Power Company (Executive).
R. H. Parkinson	Kelowna, B.C.	Western Orchard Company.
C. Perry	Lethbridge, Alta.	Lethbridge.
William Pearce	Calgary, Alta.	Executive, W. C. I. Assn.
S. Rodgers	Guelph, Ont.	Ontario Agricultural College.
J. M. Robinson	Naramata, B.C.	Summerland Development Company.
J. O. Robinson	" "	" "
H. W. Raymer	Kelowna, B.C.	Kelowna.
W. Crawley Ricardo	Vernon, B.C.	Coldstream Estate.
J. E. Reckie	Okanagan Mission, B.C.	Okanagan Mission Farm and Orchard Company.
A. H. D. Ross	Toronto, Ont.	Canadian Pacific Forestry Branch and University of Toronto.
Norman S. Rankin	Calgary, Alta.	Permanent Secretary and City of Calgary.
H. J. Russell	Winnipeg, Man.	Official Reporter and representative of Winnipeg Free Press.
T. C. Rose	Kelowna, B.C.	Editor Kelowna Courier.
James Ritchie	Summerland, B.C.	Kaleden Irrigation and Power Company.
P. M. Sander	Calgary, Alta.	Chief Hydrographer, Department of the Interior.
L. F. Stobart	Kamloops, B.C.	Farmers' Institute.
T. G. Speer	Kelowna, B.C.	Agricultural and Trade Association.
C. A. Stoess	" "	Belgo-Canadian Fruit Lands Company.
W. H. Smith	Vernon, B.C.	Vernon.
W. E. Scott	Victoria, B.C.	Deputy Minister of Agriculture.
Harvey Smith	Bassano, Alta.	Board of Trade.
R. S. Stockton	Strathmore, Alta.	C. P. R. Superintendent of Operation and Maintenance.
W. F. Somers	Victoria, B.C.	B. C. Fruit Growers' Association.

LIST OF DELEGATES ATTENDING THE 1912 CONVENTION—*Concluded.*

Name.	Address.	Representing.
E. W. Sutherland.....	Kelowna, B.C.....	Kelowna City Council.
Reve Shubert .....	Armstrong, B.C.....	Municipality of Spallumcheen.
C. Smith .....	Kelowna, B.C.....	Farmers' Institute.
J. S. Stockwell.....	" .....	Kelowna Poultry and Pet Association.
W. Y. Schell.....	" .....	Okanagan Development and Orchard Company.
P. Stone.....	Calgary, Alta.....	Calgary Herald.
W. T. Shatford.....	Penticton, B.C.....	Southern Okanagan Land Company.
D. W. Sutherland.....	Kelowna, B.C.....	Kelowna.
R. R. Stuart .....	San Jose, Calif.....	California Board of Education.
H. M. Scott.....	Guelph, Ont.....	Ontario Agricultural College.
H. P. Taite.....	Kamloops, B.C.....	Farmers' Institute.
W. H. Thacker.....	Westbank, B.C.....	"
E. C. Thrupp.....	Kamloops, B.C.....	Fruit Lands Owners' Association.
D. E. Taylor.....	Kelowna, B.C.....	Bankhead Orchard Company.
J. W. Thompson.....	" .....	Kelowna Irrigation Company.
H. Thorner.....	Kamloops, B.C.....	B.C. Department of Agriculture.
Egbert Trask.....	Kelowna, B.C.....	Wood Lake Fruit Land Co.
Alfred Unsworth.....	Sardis, B.C.....	Fruit Growers' Association.
James Vallance.....	Vernon, B.C.....	Vernon.
L. L. Vicary.....	Peachland, B.C.....	Board of Trade.
O. J. Wegen.....	Creston, B.C.....	"
Charles Wilson.....	Vernon, B.C.....	White Valley Irrigation and Power Company.
F. E. R. Wollaston.....	Kelowna, B.C.....	Belgo-Canadian Fruit Lands Company.
John Woolsey.....	Rutland, B.C.....	Rutland Estate Irrigation Company.
Cecil Ward.....	Kamloops, B.C.....	Fruit Lands, Limited.
E. J. Coutter White.....	Summerland, B.C.....	Fruit Growers' Association.
J. J. Warren.....	Okanagan Centre, B.C.....	Okanagan Valley Land Company.
R. J. G. White.....	Calgary, Alta.....	Chief Clerk, Department of the Interior, Irrigation Office.
L. W. Wheatley.....	" .....	Assisting the Permanent Secretary.
R. M. Winslow.....	Victoria, B.C.....	Provincial Horticulturist.
C. W. Whyte.....	Peachland, B.C.....	Peachland Real Estate and Fruit Company, Limited.

Invitations were also sent to all members of the British Columbia Fruit Growers' Association and to all those holding water rights in the Provinces of Alberta and Saskatchewan, comprising 648 additional names.

CHAIRMAN.—You have heard the report of the secretary; what is your pleasure regarding it?

Moved by Mr. E. Foley-Bennett, Penticton, seconded by Mr. C. H. Cordy, Summerland, that the report be adopted.—Carried.

CHAIRMAN.—An interim report has been received from the Committee on Credentials and will now be presented to the convention.

Mr. W. H. FAIRFIELD.—I am glad to report that 140 accredited delegates have registered up to the present. (Applause.) This is merely an interim report; we understand there are a number coming yet.

The secretary announced a few moments ago that the constitution would be discussed shortly, and there is one point we have been considering as the Committee on Credentials. You will notice that two delegates are allowed from the different organizations—agricultural, horticultural and so on—and we feel that these organizations should have a certain status, a certain membership. Some of these may be organized with two or three members, and they could appoint themselves delegates,

and, according to the constitution at present, would have the same voting power as larger organizations. We merely suggest this as a point that should be considered. (Applause.)

Moved by Mr. Barnes, Enderby, seconded by Mayor Jones, Kelowna, that the report be adopted.—Carried.

CHAIRMAN.—The next order of business is general business, including consideration of the tentative constitution and rules which have been submitted. I will read the constitution clause by clause.

The chairman then read successively *clauses one, two, three, four and five*, which were unanimously passed as read.

*Article 6.*—Moved by Thomas Bulman, Kelowna, B.C., seconded by C. C. Prowse, Kelowna, B.C., that the word 'three' in the first line of Section 4, Article 6, be changed to 'five.'—Carried.

*Article 7.*—Moved by Robert S. Stockton, Strathmore, Alta., seconded by P. J. Jennings, Calgary, Alta., that in addition to the Commissioner of Irrigation of the Dominion Government, two delegates be accredited to this department, one from the Irrigation Branch and one for the Hydrographic Surveys Branch of the Irrigation Department.—Carried.

Moved by J. A. MacKelvie, Vernon, B.C., seconded by T. G. Speer, Kelowna, B.C., that the words, 'Editors of agricultural journals published in western Canada,' be changed to read, 'Editors or representatives of agricultural journals and newspapers published in western Canada.'—Carried.

Moved by C. W. Dickson, Kelowna, B.C., seconded by William Pearce, Calgary, Alta., that the paragraph, 'Two delegates each for all irrigation and irrigation colonization companies operating in the Provinces of British Columbia, Saskatchewan and Alberta' be changed to read 'Three delegates each for all irrigation and irrigation colonization companies operating in the Provinces of British Columbia, Saskatchewan and Alberta.'—Carried.

Moved by William Pearce, Calgary, Alta., seconded by Norman S. Rankin, Calgary, Alta., that to the clause 'The Dominion Director of Forestry' should be added 'and Chief Forester of British Columbia.'—Carried.

Moved by J. C. Dufresne, Penticton, B.C., seconded by B. A. Moorhouse, Kelowna, B.C., that the clause 'Five delegates for the Canadian Society of Civil Engineers' be amended to read, 'Five delegates for the Canadian Society of Civil Engineers, and two additional delegates from each branch of the society in British Columbia, Saskatchewan and Alberta.'—Carried.

Moved by C. W. Dickson, Kelowna, B.C., seconded by William Pearce, Calgary, Alta., that the clause 'Two delegates each for all municipal, village and rural organizations' be amended to read, 'Three delegates each for all municipal, village and rural organizations.'—Carried.

An extended discussion arose over the clause of Article 7 reading, 'Two delegates each for all agricultural, horticultural, forestry and live-stock associations in British Columbia, Saskatchewan and Alberta,' and it was moved by William Pearce, Calgary, Alta., seconded by E. C. Thrupp, Kamloops, B.C., that the chairman nominate a committee to consider the clause and report with a proposed amendment.—Carried.

The chairman appointed as a committee to discuss this clause Messrs. Bulman, Stobart, Scott, Fairfield, White, Pearce and Thrupp, to report to the convention the following day.

The chairman then read *Articles 8 and 9* of the constitution, which were unanimously passed as read.

*Article 10.*—Moved by A. E. Ashcroft, Vernon, B.C., seconded by R. M. Palmer, Kamloops, B.C., that the words 'three months' be struck out, and the words 'one month' substituted in lieu thereof.—Carried.

The chairman then read the rules embodied in the constitution, and it was moved by William Pearce, Calgary, Alta., seconded by Dr. C. W. Dickson, Kelowna, B.C.:

That Rule 4 read as follows:—Any delegate or other member desiring to speak shall address the chair, and unless called on by name shall begin by giving his name and place. Communications on subjects not entered in the programme shall be limited to five minutes, unless otherwise directed by vote of the convention.

That Rule 6 read as follows:—The time of speakers in general discussion shall be limited to ten minutes, and the time of speakers on questions or resolutions relating to the conduct of the convention shall be limited to five minutes, unless otherwise directed by vote of the convention.

That Rule 7 be deleted altogether.—Carried.

The remainder of the rules as read, were passed unanimously.

Mr. J. S. DENNIS then read an interim report of the Committee on Resolutions, as follows:—

The Committee on Resolutions beg to submit Resolution No. 1, which reads as follows:—

#### RESOLUTION No. 1.

Moved by Hon. Price Ellison, Minister of Finance and Agriculture, seconded by W. Crawley Ricardo, that

Whereas the province has sustained an irreparable loss in the death of Mr. R. H. Agur, of Summerland, who by his active efforts and personal influence has accomplished so much towards the successful development of the horticultural industry of this province, and more especially that of the Okanagan valley, and who has always shown his great interest in the intelligent conservation and application of water for irrigation purposes,



Be it therefore resolved, that this meeting in convention assembled does hereby tender its sincerest sympathy to Mrs. Agur and family in their sad bereavement, and that the secretary be instructed to forward a copy of this resolution to Mrs. Agur.—Carried.

Mr. J. S. DENNIS.—Before the chairman puts that resolution, ladies and gentlemen, I would like to say, as an old friend of Mr. Agur's, having known him for many years and been associated with him since the organization of this association, that I appreciate the opportunity of saying that no man in this province, in my opinion, had done more, or did more, in introducing the subject of irrigation and insuring its application on sound principles than Mr. Agur. Further than that, no man associated with this convention, from its inception up to the time of his untimely death, has done more to assist us in our deliberations. His death is a great loss to this association and to the province of which he was a citizen.

Mr. W. CRAWLEY RICARDO.—I would like to echo the words of Mr. Dennis and say what we feel in the Okanagan. Mr. Agur had his heart and soul in the fruit industry, not only in this part but in the whole of British Columbia, and he took as great an interest in irrigation. We are only beginning to realize now what the loss is to us. He had the quality so few men have, of bringing men of contending opinions together in a common cause.

CHAIRMAN.—You have heard the resolution. I declare it carried.

#### RESOLUTION No. 2.

Moved by F. J. FULTON, K.C., seconded by W. Crawley Ricardo, that

‘Whereas, the experience of the previous conventions of this association has shown that the problems and questions in connection with irrigation in the Province of British Columbia are widely different from those in the Provinces of Alberta and Saskatchewan, and has also shown that the number of delegates from British Columbia attending the meetings when held in Alberta or Saskatchewan is very small, as is also the number of delegates from Alberta and Saskatchewan when the meetings are held in British Columbia;

Therefore, be it resolved that in the opinion of this convention it is advisable to form separate associations in the Province of British Columbia, and in the Provinces of Alberta and Saskatchewan, which, while remaining affiliated with each other, will hold their conventions separately.

Mr. F. J. FULTON.—Mr. President, this is the resolution I gave notice of at the convention last year in Calgary. I said then I would not press it last year but that I wished to give notice that I would bring it forward this year, and I said that if the result of the year's work at this meeting showed that the convention had done better work and that more interest had been taken by the representatives from the other provinces than in the past, it was altogether likely that I would withdraw the resolution.

I have asked the Resolution Committee this morning to report this so that might have the opportunity of speaking to it in the convention and withdrawing as openly as I gave notice of it last year. I am glad to find, partly as a result of the notice I gave last year, but a great deal more owing to the energy and activity of our present secretary, Mr. Rankin (applause), that the executive have found that the work of the convention last year was pushed through—'followed on,' as Mr. Rankin expressed it then—to a happy conclusion, and that the resolutions we passed at Calgary have been taken up and dealt with by the governments, chiefly the Dominion. At this convention I am glad to find there are, I understand, not less than forty delegates from the other side of the mountains—showing that this year a great deal more interest has been taken than in the past. (Applause.)

I said at Calgary last year that I was sorry to find the interest dwindling, that at the first convention of all there were some forty delegates from British Columbia and a good number from Alberta and Saskatchewan. At the next meeting in Vernon there were a few from the Northwest. At Lethbridge there were only about twenty from British Columbia; at Kamloops there were not more than twelve from the Northwest, and at Calgary last year there were not more than seventeen from British Columbia; and largely on that account I gave notice of this resolution.

Now, with the consent of the seconder, and, if the convention allows me, I have great pleasure in withdrawing that resolution, but before doing so would like to make a personal appeal to the British Columbia delegates and associations, farmers' institutes, boards of trade and other bodies, that they continue to show the same interest as they have shown this present year, and that the next convention, which I think will be held on the other side of the mountains next year, will be much more largely attended by representatives from British Columbia than in the past. (Applause.)

Resolution withdrawn.

### RESOLUTION No. 3.

*(Embracing original Resolutions 2, 3 and 5.)*

Moved by J. S. Dennis, seconded by Hon. F. J. Fulton,—

Whereas the dry belt of British Columbia has been, and is being, rapidly developed by means of irrigation;

And whereas it has been found that in many instances such development is being retarded by reason of conflicting interests in the source and control of the water-supply;

Therefore, be it resolved that the Provincial Government be respectfully urged to consider the advisability of passing such legislation as will remedy the difficulties which have been found to exist, and, if possible, to authorize the incorporation of water districts with control and distribution of all water-supply, therein avoiding, if means thereto can be devised, the causes which have led to failure in the carrying into effect of legislation along similar lines in many of the United States and in the Northwest Territories.

Mr. DENNIS.—The Resolutions Committee carefully considered Resolutions 2, 3 and 5, as presented to them. These resolutions cover probably the most important

subjects which will be presented at the convention. They cover the subject of the passage of legislation for the introduction of irrigation undertakings as a municipal work. This is a subject which has been of great interest in all countries and on this continent where irrigation is practiced. A great many years ago southern California decided that the time had come when irrigation development should be the result of municipal effort and an Act was passed, under the provisions of which municipalities could be incorporated and raise money by the issue of bonds. Under the provisions of that Act, a certain amount of irrigation developments were completed, but under the provisions of the same Act large areas in that state became practically bankrupt, and after a time the so-called Wright Act became practically valueless.

Before the Territories were organized, an ordinance was passed, called the Northwest District Ordinance, which provided for the creation of municipalities and the issue of power to them to raise money by the issue of bonds to complete irrigation works. That experiment failed and many more similar experiments have failed since then everywhere on this continent. Now, the Resolutions Committee have felt that this matter is very important and should be dealt with along broad lines. It is not possible for this convention, during the short time we have, to discuss this subject in the thousand and one aspects necessary, and therefore we have thought it well to consolidate the views in the three resolutions, putting them in concrete form for general discussion.

Mr. THOMAS BULMAN.—In connection with original Resolution No. 2, the farmers of this district—and I am one of them—have some knowledge of their desires, and we feel that irrigation as administered to-day is, to say the least, very faulty. We feel that the capital that has been invested will eventually demand some consideration. They cannot be expected to allow large sums of money to lie in these works without a reasonable return of interest, and it is only to be supposed that legislatures will allow these companies to make tolls for reasonable interest. We know from experience that 'reasonable interest' can become quite a tax before it can be interfered with by the government. Earnings not necessarily spent in development or dividends may be distributed in large salaries or used up in many ways, and it seems to us that our government is in duty bound, sooner or later, to make it possible for the inhabitants of these districts to act in co-operation. I admit what Mr. Dennis says of conditions in the States, but the farmers of this valley are not anxious to have disaster follow their efforts, and we wish for some Act that can take the matter out of the present cumbersome methods and have them put under some co-operative administration that will not allow it to be used by unprincipled men who have the glad hand but not the ability to administer affairs. We must not be held back by capital to-day. I think public opinion is strongly in favour of the principle that things of this kind should be municipalized or brought into water districts so that companies will not stand in our way, and we must also have all necessary information from start to finish to submit to the whole district. All I wish to see is some plan of co-operation that will develop our country *in toto*, not a few acres here and there, but we must have the assistance of the government in securing the actual facts, and we must not be at the mercy of corporations raising prices whenever they consider it necessary, to secure a more 'reasonable' return upon their investments. (Applause.)

Mr. C. E. LAWRENCE.—Mr. President and gentlemen: In gathering data for the Commission of Conservation I have to call upon several representative men in each district all through the West Kootenay and Boundary country, and I may say that nine out of ten of those upon whom I have called, when speaking of their difficulties, have expressed their anxiety in that one word, 'water,' and I should think all, or nearly all, have, in expressing their views for the commission, emphasized their opinion that the time has come when it is absolutely necessary that the government take over the conservation, control and distribution of water necessary for irrigation. (Applause.) The growers and producers up there are satisfied that there is no other way of handling the difficulties, and in their loyalty to the government they are willing to place the working of the whole of the details in the hands of the executive of the government. (Applause.)

A DELEGATE.—Might we have the resolution read again?

Mr. Dennis thereupon read the resolution a second time.

Mr. PALMER.—I notice on the programme a paper by Mr. Ashcroft, which appears to bear on this question, and it appears to me that it might be possible to defer discussion of this resolution until after that paper has been read. I make a motion to this effect.

The motion was seconded by Mr. Pridham, and carried.

#### RESOLUTION No. 4.

Moved by E. C. Thrupp, Kamloops, seconded by Mr. Stobart:

Resolved, that the Dominion Government be requested to amend the Railway Belt Water Act:

1st. By including in its scope the amendments of the British Columbia Water Act of 1909, which have already been passed;

2nd. By revising Clause 3 and making it clear with regard to:

- (a) 'Establishment' of existing rights.
- (b) Definition of the nature of riparian rights which are not to be disturbed.
- (c) Whether the British Columbia Government may in any way interfere with existing 'established' or riparian rights.

Mr. THRUPP.—This is a local question, and I appeal for the sympathy of the delegates from other districts. We in the Railway Belt have had an absolutely chaotic condition. The Dominion Government has passed what is known as the Railway Belt Water Act; it has not yet come into force. That Act offers to the British Columbia Government the administration of the water-rights in the Railway Belt on the lines of the British Columbia Water Act of 1909. It offers as a sort of agency with one month's notice to terminate, but makes certain reservations, one with regard to certain riparian rights. Now, sir, what are riparian rights? The rights there at the present time are riparian rights in accordance with the English law, and the riparian rights with regard to irrigation under English law are broadly these: that any person is entitled to take a reasonable proportion of the flow of a stream and use



Crawford's Falls, Kelowna, B.C.



it for irrigation purposes. You won't find that broad principle laid down in any definite statute, but it has been established by numerous decisions of the English courts of law during the last century. That is the law we have at present, and this new Act makes a reservation with regard to certain riparian rights. I am afraid that is going to lead to further chaos and litigation in the Railway Belt. The first principle of the British Columbia Water Act is to dispose of the old riparian rights and substitute the British Columbia Water Act, which puts those rights on a totally different basis, and I appeal to the whole convention to assist us in the Railway Belt to get our laws brought down to one common basis to apply to the whole of the province. That is the essence of the resolution.

The resolution was then put and declared carried.

#### RESOLUTION No. 5.

Moved by E. C. Thrupp, Kamloops, seconded by Mr. Stobart:

Resolved, that the form of agreement used by companies for the supply or conveyance of water for irrigation purposes, or for the supply of electric power for irrigation pumping, shall be made on forms approved by the Lieutenant-Governor in Council.

CHAIRMAN.—You have heard the resolution. Carried.

I will now call upon Mr. H. R. MacMillan, Chief Forester of British Columbia, who will address us on 'The Work of the Forest Branch and its Relation to Irrigation.'

MR. H. R. MACMILLAN.—Mr. President, ladies and gentlemen: The presence of a forester at an irrigation convention needs no explanation. Every movement for the protection of forests in America, especially in western America, has received its strongest support from such conventions as this. For this reason I feel I should thank you. I desire further to secure your further support for the forest policy which has been planned by the Hon. W. R. Ross, and which is now being carried out by the Provincial Forest Service.

One of the first duties of the Forest Branch is to make a general survey of the province. The work has been already started; ten parties are now in the field. The object of these surveys is twofold: first, to obtain a statement of the quantity of the timber in the province and a map showing where it is; second, to make a land classification showing definitely the location and character of any areas of agricultural land anywhere in the province, and the boundaries of those areas which are unfit for agriculture, and which can be made useful to the community and profitable to the province only by being kept under forest cover.

It is not the policy of the Forest Branch to endeavour to hold for timber purposes any areas which may be used in any manner for agriculture. All such areas will be examined carefully, and all details reported to the Lands Department, so that steps may be taken to open them up for settlement. It is expected that the forest survey parties at present in the field will be able to report the discovery of agricultural lands the existence of which is unknown. The chiefs of all parties have had engineering

training, and have been instructed to report on the possibility of irrigating any agricultural land they may discover.

This forest survey will define clearly those areas which can grow no crop except timber. It will be the policy of the Forest Branch to recommend the setting aside of such areas as government forest reserves to be managed and protected for the constant production of timber. It will be to your interest as citizens and as irrigation men to give active support to that policy.

The Forest Branch recognizes the paramount necessity of protecting the watersheds from which water is secured for irrigation or other purposes. Not only is the forest the mother of the fountain, it is the regulator of the fountain's flow. We do not say that without the forest there would be no irrigation, but we do believe that throughout all southern British Columbia the forest cover on the upper hills exercises a valuable function in regulating destructive extremes of flood and drought. To destroy the forest is to upset the balance of nature; the inevitable result is the rapid run-off of the water in floods, which cause the direct loss to the individual and the community by the destruction of roads and bridges, flooding of valley lands, and, most of all, by the subsequent loss in crops through a lack of water for irrigation.

Every citizen is interested in prosperity. The forest means prosperity. The mature timber means prosperity now; the young timber means prosperity in the future. There are 10,000,000 acres of burned over land south of the Railway Belt upon which no other crop can ever grow than timber, and which is now growing up to young timber. The Forest Branch is doing its utmost to keep fire out of that timber, and for strictly financial reasons. Every acre on an average will grow 100 board feet per year. This is a total annual growth on this burned-over area of one billion feet per year; that is, these ten million supposedly worthless acres will in a few years produce an annual crop of one billion feet of lumber. One billion feet of lumber is the biggest annual cut ever made in the whole province, and is about two and one-half times as great as the present cut in the area south of the Railway Belt to which I am referring. The revenue to the government would be, for royalty alone, half a million dollars a year. The manufacture of this timber would create towns, local industries, pay-rolls and markets. And these are what the Forest Branch stands for; therefore it seeks your support.

This great crop is dependent upon protection from fire, just as your irrigation crops are dependent upon protection from drought. Forest protection costs money. The Forest Branch is patrolling, for fire protection, fifteen million acres south of the Railway Belt. This fire protection now costs one-third of a cent per acre per year. That is not enough. On the eastern slope of the Rocky mountains, where the forest is not so valuable, the Dominion Government has an appropriation of one cent per acre per year. In the United States the timber owners voluntarily pay an average rate of two and one-half cents per acre.

Money spent in the prevention of forest fires is returned to the government ten-fold in the form of royalties on timber, and to the community three-hundred-fold in the form of wages.

In conclusion, permit me to suggest that for your own sakes, and because of your interest in the province, you should actively and aggressively support the two out-

standing Forest Branch policies of creating permanent timber reserves and protecting the forest from fires. (Applause.)

CHAIRMAN.—Convention will adjourn to meet again at 2.30 p.m. sharp.

#### EXECUTIVE COMMITTEE MEETING.

A meeting of the Executive Committee was held at the close of the morning session, at which Messrs. Dennis, Pearce, Bulman, Ross, Fulton, Elliott and Fairfield were present. Mr. Dennis read the financial statement, which showed a balance on hand to date of \$1,923.29. Mr. Fairfield moved, and Mr. Fulton seconded, that the financial report be adopted.—Carried.

Moved by Mr. Bulman and seconded by Mr. Fulton; that the yearly allowance of the permanent secretary be increased to \$500 and that he be voted a bonus of \$200 for his work of the past year.—Carried.

Moved by Mr. Pearce, seconded by Professor Elliott, that it is expedient in the interests of the association the executive should meet, if at all possible, at least on two occasions between the annual conventions, the place and time to be a matter of arrangement.—Carried.

The committee found that the entries in the bank book of the association were correct, and that the accounts were in accordance with the financial report.

### WEDNESDAY AFTERNOON SESSION.

The convention reassembled at 2.30. Mr. Dennis reported to the convention the results of the meeting of the Executive Committee, and moved the adoption thereof, seconded by Mr. Pearce.—Carried.

CHAIRMAN.—The first address of the afternoon is by Professor Alfred Atkinson, Professor of Agronomy, Montana Agricultural College, who will speak on 'The Irrigation of Alfalfa.'

#### THE IRRIGATION OF ALFALFA.

By ALFRED ATKINSON, Professor Montana Agricultural Experiment Station.

MR. CHAIRMAN, LADIES AND GENTLEMEN.—Under favourable growth conditions, alfalfa, with its strong, widely spreading root-system, is able to get food for vigorous development. Favourable growth conditions include proper temperature, good aëration, and adequate moisture-supply. In the almost ideal climate of western Canada, very profitable yields of this crop ought to be produced if the supply of moisture is regulated. The acreage given over to the production of alfalfa is constantly increasing. The question of the proper irrigation of the crop is an important one.

On account of the difference in the amount and distribution of the rainfall, as well as of other influencing factors, the details of irrigation practice will, of necessity, vary with the different localities. In some sections of the western United States a winter precipitation with a dry summer makes heavier irrigation demands than

are found in sections having greater rainfall during the growing months. Attention is directed to these facts to avoid too close imitation of the practices discussed, when such practices are not best. The hope is to bring out principles involved and to refer to some of the important features of the irrigation practice, with which the writer is familiar. Out of the experience which comes from years of practical irrigation will come the details for the best system for western Canada.

For a permanent crop like alfalfa, it is important to have the irrigation in mind before any planting is done. Properly levelled fields irrigate more easily and with much greater economy than do those having slight irregularities over the surface. The first step in alfalfa irrigation is to make a compact and carefully levelled seed-bed.

The land ought to be ploughed a sufficient time before seeding to allow the surface to settle. Where alfalfa is to be planted in spring, fall ploughing is wise. In sections where alfalfa does not start readily, summer-fallowing or summer-tilling the land the season previous sometimes brings good results. In preparing the seed-bed all dead furrows should be disked in, and the field should be crossed several times with a leveller. The levelling should be done the same way as the field was ploughed, then crosswise of the ploughing, and again across from corner to corner. If these three levellings do not remove the unevennesses, the field should be crossed again. This may appear like a lot of work, but when we remember that the crop will be down for a number of years, it is apparent that a little extra labour in preparation is a wise investment.

Many kinds of levellers are in use and effectiveness is not wholly confined to any one. A leveller that is favourably spoken of is made as follows: Take two 2 x 10's, 16 feet long, and fasten them together strongly with three 2 x 10's, 8 feet long. These three cross-pieces are to be placed one close to the front, one near the rear, and the third in the centre. The front and back cross-pieces are to be slanted slightly so that they will not present a firm cutting surface. The centre cross-piece ought to be strongly braced in an upright position and fitted with a metal cutting edge. This edge shaves off the irregularities. The advantage in having the leveller long is apparent. It is used to smooth the surface and, like a smoothing plane, is best when long. This implement will level a strip eight feet wide each time across the field. When it is carrying reasonable weight four average horses will handle it without inconvenience. Good levelling cannot be too strongly emphasized.

Many alfalfa growers have found it wise to put in the ditches before the planting is done. The advantage in this lies in the fact that plants may be kept from growing in the ditches and interfering with the flow of the irrigation water. The only precaution needed is to see that no seed falls in the bottom of the ditches.

The location and distance apart of the ditches must be determined for each particular field. After a little experience a practical irrigator is able to locate the necessary lateral ditches. For the main head or supply ditches, it is best to have these located by an engineer or some one of experience in this work. Some of the common mistakes in putting in lateral ditches are to put them on a grade that is too steep, and to put them too far apart. Ordinarily, lateral or distribution ditches ought to be placed from fifty to sixty feet apart, and the fall should not greatly exceed one inch to the rod. In the case of a field with a definite sidehill slope the laterals

should run around the side of the hill. Laterals are commonly put in with a double moldboard plough. When the fall will permit, it is obviously best to make them straight. This makes for ease in cutting and handling the crop. The machinery does not strike the ditches at different angles. However, this advantage is not sufficient to offset the serious disadvantages from the washing of the ditches and the improper distribution of the water where ditches are on a grade that is too steep.

In order that the water may be turned out of the ditches at the proper places, diversion dams are put in every sixteen to twenty feet. When the ditches are freshly made, these dams may be of dirt gathered in the bottom of the ditch.

After the alfalfa becomes well established, dirt dams are not practicable and manure dams are generally used. These dams consist of piles of manure in the bottom of the ditches, and this is spread over the field as the dams are removed during irrigation. In some sections canvas and metal dams are used. The canvas dam is made by stretching heavy-weight canvas to a cross-piece which is wide enough to go across the ditch. The canvas is long enough so that it lies along the bottom of the ditch for six or eight feet, and is held down by a few shovelfuls of dirt thrown on it. This form of dam makes for a relatively small amount of shovelling, and seems to be gaining in popular favour. Metal dams are usually made of galvanized iron, and shaped so that they fit the bottom of the ditch to a certain extent. A strong central stake is provided and the dam is driven down into the ditch.

Turning from a consideration of the preparation to the actual irrigation, two questions stand out as of chief importance. These are: when should alfalfa be irrigated, and how much water ought to be used? As to the proper time of irrigation, the common practice includes irrigation before the first crop is cut, or irrigation for the first time after the first cutting of hay has been removed from the field. Where there is a fair amount of rainfall during the early summer, and where there are apt to be showers while the first crop is curing, it is usually best to add no irrigation water until this crop has been removed from the field. The irrigation can then be given quickly to start the second crop. Where springs are dry, and especially where good curing weather may be depended on at haying time, it insures a prompt start in the second crop if the field is irrigated ten days or two weeks before it is ready for the first cutting. After the second crop has been removed, the field is again irrigated. In localities where four crops are harvested, irrigation is again necessary after the third crop. At the higher altitudes and under other conditions where curing is slow in the fall, no fourth crop is cut, but instead the fields are pastured. In this case irrigation is not practiced after the third cutting.

The question of the amount of water to use merits careful consideration. It might safely be said that in the majority of cases irrigation farmers are using much more water than is necessary. The truth of this is shown by the increase in acres ruined by alkali, and by the swampy condition which is noted on the lower lands in irrigated sections.

If we compare the natural precipitation of irrigated areas with that of humid sections where no irrigation is practiced, we will find that the difference does not exceed ten to fifteen inches a year on the average. In many humid localities the crops would be benefited by a little more rainfall, so we must naturally expect to more than make up this difference. If water equivalent to fifteen or twenty inches should be



added at the proper time, it ought to fully supply the amount needed for the growth of the crop. A study of the duty of water or of the amount of water which is being used from many of the streams in the State of Montana shows that the amount taken out during the irrigation season is sufficient to cover the irrigated land to a depth of seven feet. This is equivalent to a precipitation of eighty-four inches, and is very evidently too much. Of course this water does not pile up evenly on the land. It does, however, run over the fields, washing out the available plant food, filling up the soil so as to exclude the air and bring the alkali to the surface, and making swamps of the lower lands.

Many irrigation farmers entertain the mistaken notion that water is plant food. Water is the dissolver and the carrier of plant food, and must be used for these purposes. If supplied in proper quantities, it moistens the soil and makes conditions favourable for growth. If too much is applied, the effect is sure to be harmful. After the soil has been wet down four or five feet the addition of water ought to be discontinued. To pour more on only fills up the lower soil-layers, shutting out the air and making conditions unfavourable for root development, or, in case of soils where the subsoil is open, washing through and carrying the dissolved food with it.

Irrigation farming controls one more factor than is controlled in humid agriculture. The irrigator may have rain when he needs it. In western Canada, where the soils are stored with much accumulated plant food and where the hours of sunshine during the growing season are greatly in excess of those in eastern localities, the conditions for very high production are most favourable. An irrigation system properly utilized practically insures maximum crops every year. The irrigation farmer should inform himself so that he may put the system to its proper use. (Applause.)

CHAIRMAN.—Professor Atkinson's paper is now open for discussion, and any one who wishes may ask questions or make comments thereon.

A DELEGATE.—Which is the best way to make the alfalfa plant penetrate?

Professor ATKINSON.—Well, they are just born that way. Do you mean in relation to subsoiling, or something of that sort?

DELEGATE.—Well, on dry soil in the bench lands, where the water cannot be available, say, for two crops, is there any way of irrigating to make the roots penetrate for their supply of moisture?

Professor ATKINSON.—Well, I don't really know of any way to encourage that. Of course, too much free water makes for shallow rooting. In some sections I have seen fall irrigation practiced, and I have seen that result in killing out the crop and I have also seen some very good results. I should think the winter-killing difficulty would not amount to much here. I have seen spring flooding practiced also. Where we have no system of irrigation, we practiced irrigation. We put the disks on in the spring and disked the surface up thoroughly.

DELEGATE.—There may not be enough moisture in the soil to grow a second crop. Is there a way to make the roots penetrate so that by a good irrigation, say in June, we could grow a second or, possibly, a third crop?

Professor ATKINSON.—I think so. The Montana Station conducts sixteen farms over the state and with a system of merely disking, we cut a second crop regularly, with no irrigation, and a rainfall of sixteen inches. We get two crops without irrigation.

DELEGATE.—At what depth would you moisten the land?

Professor ATKINSON.—That varies with the soil. The ordinary practical system is to shove a shovel down and see if the surface is wet down the full depth. The plants will draw moisture from ten feet, if we get the land wet down five feet when we go over the land. Much of our soil is underlaid with gravel from two to four feet. If the land is sandy, the water will go down a good depth. On an ordinary loam soil, five feet wet is a good fair wetting.

Mr. CONROY (Kelowna).—How would you sow, with grain or without?

Professor ATKINSON.—Up till a few years ago, we sowed without, as we thought it would injure the alfalfa and set it back. We regularly now sow it with grain. We sow lightly with oats, two bushels to the acre alone, and with alfalfa, two bushels and a half. If you put it in by itself, you will not get very much the first year.

Mr. CONROY.—How many pounds to the acre?

Professor ATKINSON.—Twelve, ordinarily. We formerly sowed twenty, but now the general practice is about twelve.

Mr. CONROY.—Does it do well on light soil?

Professor ATKINSON.—If you have irrigation, it does. On soils that run pretty high in reasonably coarse sand, if you have irrigation to start it, it does all right. It is one of the best plants for curing that sort of soil. The roots pack the soil and stop blowing.

A DELEGATE.—How would you start the roots the first and second year to make them penetrate ten or twelve feet?

Professor ATKINSON.—I must confess I have not the slightest idea. The stuff will penetrate, and I think there are records of penetration beyond that depth. The impetus to penetrate will be the scarcity of moisture, to keep them going on. That makes it a good dry-farm crop. Of course, the state of the soil is a factor. A content of lime is very desirable for alfalfa. But on any particular soil you just have to let them develop. It might be well to keep the water off in the early growth. Have you had any experience yourself in that?

DELEGATE.—No; I was trying to get the knowledge of how to grow it.

Professor ATKINSON.—Dr. Fortier might be able to tell you on that.

Mr. STOBART (Kamloops).—Would it be better to disc alfalfa in the fall or spring? If disced in the fall, would the snow be more liable to penetrate to the roots?

Professor ATKINSON.—We always disc in the spring; not in the fall at all. Of course, the winter with us in Montana is a factor in our alfalfa.

Mr. STOBART.—Is it better to use the disc harrow or alfalfa cultivators?

Professor ATKINSON.—We use the ordinary disc. We have found the teeth bend over on the others on the rough land. We use the ordinary disc and run it rather straight.

Mr. TAYLOR (Kelowna).—Where we have reclaimed alkali ground, drained about eighteen inches to two feet, is it suitable for alfalfa?

Professor ATKINSON.—Alfalfa is like sugar beets; it seems to be able to grow in a pretty dense soil solution. Lands pretty strong in alkali are pretty well adapted for alfalfa. In that respect it is better than other crops.

Mr. TAYLOR.—When you get below eighteen inches, you get the water-logged soil.

Professor ATKINSON.—Well, it has been stated that alfalfa will not grow with wet feet, but I don't believe the alfalfa minds; but where you are reclaiming an alkali soil, alfalfa is one of the good things to put in pretty early.

Mr. TAYLOR.—What percentage of sodium carbonate will it stand?

Professor ATKINSON.—Well, I don't recall the figures now. There are publications on that. I think I can possibly look up something for you.

Mr. TAYLOR.—Do you recommend the alfalfa sown broadcast or in drills?

Professor ATKINSON.—We sow with a drill.

Mr. TAYLOR.—Do you cultivate between the rows?

Professor ATKINSON.—No; we have tried it some when it was altogether for the production of seed, putting the rows twenty-four inches apart.

Mr. TAYLOR.—With experiments in South Africa I have seen returns where lands cultivated gave a ton and a half and more than when sown broadcast.

Professor ATKINSON.—I have seen favourable reports from Algeria on that.

Dr. FORTIER.—I would suggest that the gentleman interested in the reclamation of drainage lands write to the department for a bulletin on that subject.

A DELEGATE.—Is it not a fact that alfalfa sown on retentive soil, i.e., a tight soil that retains the moisture, will dry out and rot?

Professor ATKINSON.—It has not been our experience at all. That is just one of the sorts of soil that alfalfa will correct. Its roots will get down, decompose and let tunnels in and open up the soil. The retentive soil will make for slower growth on the start, but the alfalfa will conquer the soil.

Mr. JAMIESON.—What is the proper time of year to seed alfalfa?

Professor ATKINSON.—We put it in in the spring, just as quickly as we can get the land in shape—in the irrigated valleys from the first of April to the tenth of May. In Montana we usually put it in from the first of April to the tenth or fifteenth of May.

A DELEGATE.—How does alfalfa do on new land?

Professor ATKINSON.—Very well. Mechanically it is not a good thing to do. You should put on a grain crop two or three times. In land that has just been broken you will find the sod coming up with the alfalfa and interfering with the stand somewhat.

CHAIRMAN.—I am afraid we have exceeded the time allowed for discussion on this paper. I am sure I voice the sentiments of the convention when I say that we have all been instructed and edified by it. (Applause.) The next item on the programme is an address by Mr. Ashcroft.

## THE PUBLIC OWNERSHIP OF IRRIGATION WORKS.

By A. E. ASHCROFT,

Chief Engineer, White Valley Irrigation and Power Co., Vernon, B.C.

Mr. PRESIDENT, and members of the convention.—In the title of this short paper the word 'public' is used instead of the word 'government' advisedly. The difference between the two is wide, albeit in theory the government stands for the people; ownership implies taxation and the taxation that is borne by those benefiting by the expenditure of the revenue so raised is the only equitable taxation. In other words, expenditure of public funds that benefits only a particular locality should be met by taxes raised in that locality. This principle applies down through the various organized governments, federal, provincial, municipal, &c., and is a truism that needs only to be stated to be assented to. In the scheme outlined below it is attempted to show, in the matter of the subject of this paper, where the functions of the local or municipal government and those of the central or provincial or Dominion government apply.

Irrigation, as practiced in the Dry Belt districts, is pre-eminently a fit subject for public ownership and control. The well-being of the cultivator of the soil, and, therefore, of every inhabitant of these localities, depends absolutely on an adequate supply of water at the right time, and, in a lesser degree, at a moderate price. Under present conditions this necessity is meted out mostly by incorporated companies, whose official object must be to raise the maximum revenue for the shareholders at the minimum of yearly expense. The water-user is protected against extortion by his contract and by the government supervision of rates; he is protected against a failure to supply water, which would, in the case of an orchardist, mean absolute ruin, only by the standing and strength of the particular company whose system covers his land. This is no chimaera or fanciful danger; it is hanging like a sword of Damocles over thousands of acres of beautiful orchard homes. Irrigation companies are not a financial success as such. Combined with the business of selling land many of them have made substantial dividends for their stockholders. The business of constructing works to convey and distribute water for irrigation financed solely on the revenue to be derived from the sale of the water is, in this province, not remunerative. If this is so (and I do not think it will be disputed) the time is not



Irrigation Piping.



Work on South Kelowna Land Company's Dam.



far distant when some radical change must be made. Higher rates, where such can be arranged, may, in certain cases, stave off the danger, but it will only be a postponement. The constant demand is for more efficiency, better class of works, less waste of water and less damage by seepage. These are more insisted on than lower rates, though in many cases the cost of water to the user is disproportionately large.

Private capital will not remain in channels where reasonable interest cannot be earned. Further capital will not be available to extend, maintain and effect necessary improvements on existing systems, unless the returns are sufficiently certain. The answer to all this is that some form of public ownership is an absolute necessity. The various systems are local, so that the ownership, and the taxation incident thereto, must be local also. The functions of the central government can be utilized in (a) formulating the legislation required to empower the locality to organize and tax itself, and (b) by throwing its financial protection in the form of guarantees over the undertakings of the local districts.

The one apparent obstacle to the formation of irrigation districts owning the irrigation systems within their borders is that old bogey, 'vested interests.' The private ownership of water-rights, &c., the ownership of waterworks to carry water, is not so formidable an obstacle, as they are physical entities and can be weighed and valued, and the principle of expropriation for the public good is well established. The framers of the Water Clauses Consolidation Act and the later legislation established the principle that water is the property of the Crown and cannot be alienated, that any rights to the use of water by individuals are contingent on those rights being used beneficially. Let this be logically carried out, and the apparent obstacle disappears. The proposal put forward by this paper is founded on the above and is as follows:—

#### IRRIGATION DISTRICTS.

The owners of three-fifths of the assessed value of real property in a locality may petition the Minister of Lands to form an Irrigation District. The minister causes a map of the proposed district to be published, the boundaries being determined solely by the irrigation features, and a vote of the property holders within the proposed district to be taken, three-fifths of the value as shown on the last assessment rolls to carry the question. If the decision is in the affirmative, the new district is gazetted, and all owners of water-rights and irrigation works are deemed to have received notice of expropriation. A board of assessors is appointed by the minister, whose duty it is to hear all claims from owners of expropriated water property, adjudicate on same, awarding each claimant the amount of the monetary loss, if any, sustained by him from the formation of the new district, and the vestings of his rights in the same. The sum total of the awards, together with the expenses incidental to organization, to be met by an issue of debentures of the district, guaranteed by the provincial government. Interest and sinking fund on these debentures, which would run for forty years, are to be met by a tax on all assessable real property in the district. The affairs of the district will be managed by a board of seven members, three appointees of the Minister of Lands and four elected from the property holders in the district—the first three to consist of the Chief Water Commissioner, the District

Water Commissioner and the District Engineer. The same individuals may be members of two or more boards within reasonable distance. The Chief Water Commissioner is ex-officio on the boards of all irrigation districts in the province. The elective members are elected for three years, one retiring each year, but are eligible for re-election. The duties of the board, besides arranging the debenture issue and collecting the annual sinking fund and interest, will be to take over and operate all irrigation works, appoint all necessary officials, fix a charge for the use of water sufficient to cover working expenses of the district.

The above is a bare outline of the scheme for the formation of the local units. The government, besides assisting the districts by guaranteeing the debentures, might be asked to further assist irrigation in two ways, viz., (1) by constructing storage reservoirs in the mountains, where such reservoirs would be of benefit to more than one district; (2) by advancing the funds for the construction of new works in localities not sufficiently developed to form irrigation districts, provided the owners of lands to be benefited place a sum equal to the estimated cost of the works as a first charge on their lands. When a specified number of owners are on the assessment roll of the locality it is formed into an irrigation district, and the amount advanced by the government is repaid by a debenture issue.

This paper is made purposely short in order to allow time for the convention to discuss the main principle. Details can be worked out afterwards by a committee, if the convention considers the idea worth following up. (Applause.)

CHAIRMAN.—The paper is open for discussion. A debate arose this morning in connection with Resolution No. 3, and was postponed for the delivery of this paper. This might be an opportune time to proceed with the discussion, so I will read the resolution again. The resolution has been printed and copies will be found in the seats. (The chairman then again read the resolution.) Are you ready for the question?

MR. MACKELVIE.—After hearing the forceful and clearcut exposition of the ideas contained in Mr. Asheroft's paper, I think this resolution must be considered to suffer severely by contrast. It is, as you were informed this morning, the result of an endeavour to bring together three resolutions, and I, for my part, believe that we have before us a resolution which is not nearly strong enough. It was said this morning by more than one speaker that this is a most vital and important subject. For several years this matter has been brought before the convention, and on more than one occasion we have succeeded in obtaining a partial expression of consent to that idea from the convention, but so far very little has been done.

Now, sir, I would like you, as Minister of Lands, to leave this convention knowing that the people of the Dry Belt and Okanagan valley do consider this the most vital question brought to your attention and one of vital importance to the development of irrigation in this district. We know the position of the Minister of Finance and Agriculture. He is a firm believer in governmental assistance to the limit in providing water to the farmers of this country, and he has behind him our full support and confidence. The resolution does not go far enough and contrasts very unfavourably with Mr. Asheroft's paper, and asks the government practically to do nothing. If this resolution were presented to any department, I think it would

consider the convention was very lukewarm in the matter, if that was the best resolution it could forward on the subject. The government has reached the position when possibly it might be well to call upon them for a commission to investigate the whole matter. If they report within two or three months, well and good; if within two or three years, it would dash our hopes again to the ground. (Applause.) We have, as pointed out by the Minister of Finance last night, upwards of ten million dollars on deposit in the banks of this province, and the largest revenue of any province in the Dominion, and the time has come when a very large amount of that money should be set apart by the government to give the relief which is so badly needed by those suffering for want of water in the Dry Belt. (Applause.)

Mr. POOLEY (Kelowna).—Might I ask who is moving this resolution?

CHAIRMAN.—Mr. Dennis is moving the resolution, as chairman of the Committee on resolutions.

Mr. POOLEY.—And is Mr. Dennis taking the responsibility of moving the motion?

Mr. DENNIS.—Yes.

Mr. POOLEY.—And this Resolution No. 3, if passed, is practically endorsing Mr. Ashcroft's paper? If so, I must really point out the fact that if we pass this resolution we should take into consideration the moral effect which this has. Mr. Ashcroft points out (from his own experience, I take it) that the sword of Damocles is hanging over the irrigation companies, and we must deplore their state. If this is so, it is well to have it well known. If it is not so, I would draw your attention to the fact that it will be one of the greatest blows to an irrigation country if, after the government have done their best to outline a system by which irrigation companies can deal with the situation, before those laws are given a sufficient trial, they should be withdrawn. I think we should take all these facts into consideration before a convention like this endorses in a sweeping manner the different points in this paper. (Applause.)

Mr. CHARLES WILSON (Vernon).—There can be no question but that this resolution, coupled with the paper read by Mr. Ashcroft, is the most important matter before the convention. The meeting of 1908 produced the Water Act. May we not hope that the meeting of this organization in 1912 may be equally productive of good? It seems to me it is more a question of procedure than of diversity of interests. The question is, are we quite ready yet to invoke the aid of the legislature to assist us in carrying out that which we all desire? The State of California first launched the idea, and under the Act they produced, I am told, and I use the words advisedly, that there are two important districts, comprising some 250,000 acres each, and that the system is working with marked success; in fact, one gentleman told me that no one single Act that the legislature of California ever passed has done so much for the development and the production of wealth in California as did that piece of legislation. But I am bound also to tell you, that it is not always a startling success. The legislation of the State of California was followed by similar Acts in arid and semi-arid districts in the United States, and in some it has actually been repealed. Now, knowing that in some places this class of legislation has been a failure, and

believing that somewhere else it has been a marked success, do you think it would have been prudent, before embarking on legislation ourselves and before embarking on the promotion and inviting the government to assist by monetary contributions the development of irrigation systems—do you not think it well that we should have taken the pains to have thoroughly informed ourselves upon a question of this kind?

It does seem to me that the government should be asked, not to promote legislation, but to disclose their sympathy by the appointment of a commission, if you like (I care not how it is done, so long as the information is secured), of some one or more persons to thoroughly study the subject from its several standpoints of legislation, legal organization, and the question of the success or failure of the system. Again, you want to find out why they have failed, when they failed, and why they succeeded when they succeeded. Are the failures due to conditions arising which were beyond the control of those involved or were they the result of maladministration? When they succeeded, was it the result of proper and successful economic administration? It seems to me that the government might well employ money for the ascertainment of these and other important facts.

Having satisfied yourselves as to the course your legislation should take, are you then in a position to prepare a bill for submission to the Legislative Assembly?

There are several ways in which enterprises of this kind may be carried out. The first method is that hitherto pursued here, of private enterprise. Now, Mr. Chairman, private enterprise means that there must be a private profit. No man, or body of men, will ever put money into irrigation or anything else, unless they see a profit in the enterprise that they are about to engage in. That may be covered in one or two ways: either where the irrigation system is run for investment, or where, as in many cases in this province, it is coupled with the sale and development of particular areas of land. Another system is government ownership, and the one suggested by my good friend, Mr. Ashcroft, is a system of public ownership, coupled with some sort of government aid. When you come to deal with the last subject, you are entering upon something which contains the elements of a great many difficulties. I am not going to deal with many, but there is the organization of new districts, the question of the extent to which the unoccupied area of land shall contribute to the assessment which will have to be levied, the organization and election of a governing body, the question of whether they shall simply be irrigation districts or municipal districts. Never for one moment confuse these two things: municipalities and irrigation works; I can conceive of no two subjects which are more divergent in their character. One requires knowledge of one class and the other knowledge of quite a different class. You have also to consider the further question of how you shall regulate and divide your tax.

With respect to raising money in California, it was found that the bonds of irrigation districts were not looked upon or regarded favourably by bankers and people with money at their disposal. The legislature of California met this difficulty in a very peculiar way. It permitted the investment of trust funds under the supervision of the attorney-general, state engineer and supervisor of banks. They formed a committee which allowed the bonds of irrigation districts to be used for the investment of trust funds. I know of no more dangerous thing than interfering with the investment of trust funds.

How, then, are you to obtain your money? Your bonds would be looked upon with immense favour if they, or a proportion of them, could be guaranteed by the government, but that is a question for my honourable friend, the chairman, and his colleagues to deal with. You may rest assured, I think, that the government will hardly undertake a responsibility of that kind until they informed themselves of the questions I have ventured to mention. Now, ladies and gentlemen, you may say that this has led to nowhere. I grant perhaps it has not, but I think what I have said to you lies right in the direction of endeavouring to bring pressure to bear upon the government to inform themselves thoroughly upon the subject as shortly as possible, in order that legislation may be brought down as early as possible, so that no delay may take place in the promotion of legislation if it is ultimately decided to pass it. (Applause.)

Mr. BULMAN.—I wish to point out to the convention that the second clause of the resolution does not to my mind express the conditions existing. A large proportion of our friends are not supplied with water, and, as far as the appointment of a commission is concerned, I believe in it, but I hope the commission is not going to be appointed to look into the question and find out that we, or some of us, happen to be in a district where it is not feasible to handle water on a co-operative basis. We believe firmly in co-operative measures and have got to get busy and get water or we will lose our entire investments, and while this commission can look into the matter of how to construe this law, it is conclusive to my mind that now we have to find a solution of how to get our water in the most economic and efficient way, and that can be done only by co-operation and not by allowing companies to manipulate the situation in order to devise ways and means of raising dividends to satisfy their shareholders and salaries. (Applause.)

Mr. PRIDHAM.—Might I ask if Mr. Wilson meant his speech to move a resolution that a Royal Commission be appointed?

Mr. WILSON.—I had no intention of moving any resolution; I simply attended this as other conventions, for the purpose of listening to the discussions, but I should have pleasure in doing it.

Mr. PRIDHAM.—May I then move this resolution:—

That the government be asked to hold exhaustive inquiries in every district and, if necessary, in California, and fully ascertain the position as regards irrigation matters, and their present condition of affairs, with a view of enacting legislation for the proper distribution of water.

A DELEGATE.—Perhaps Dr. Fortier would speak on the matter.

Dr. FORTIER.—I am scarcely sufficiently informed yet of conditions in this province to speak on this subject, but, if this audience will favour me, I would like to direct the discussion into a new channel, and that is: Are you in pressing need of more land under the ditch to accommodate the settlers who come here? It seems to me that has an important bearing on the subject under discussion. With us, we are getting far in advance of settlement; our construction work is far in advance of



actual settlement, and yet, at the same time, the governments of the States have not aided in that development. During the last fifty years we have succeeded in reclaiming about fifteen million acres of desert land. We have now under the ditch between five and six million acres that have been provided with costly structures and yet are not irrigated for land settlement. In addition to that we have fully eight million acres that are in a partially completed state, making in all about fourteen or fifteen million acres that must be settled and reclaimed for water-users in the near future. Now I take it that our conditions are better than yours as far as clearing land is concerned. Over a large part of your country you have a rather heavy timber growth, and I think it is going to take a considerable time to bring that under cultivation and irrigation and place it on a crop-producing basis. I don't care to discuss the subject further, because I intended to refer to it in my paper this evening, but may I ask the courtesy of this audience to discuss that phase of the question? (Applause.)

Mr. DENNIS.—This resolution is presented to you from the Committee on Resolutions, moved by me as chairman and seconded by Mr. Fulton, because we have had put up to the Committee on Resolutions three different resolutions all affirming that it should be the opinion of this convention that the time has come when we should have legal machinery in this province through which municipally owned and operated irrigation systems could be provided. We decided to consolidate those three resolutions into the brief printed resolution before us, which we feel deals with the subject from the standpoint, on the part of the convention, that it is necessary for the government, in view of the feelings here expressed and elsewhere, to give some consideration to the question. This resolution has not been moved on Mr. Ashcroft's paper. It was based upon the three resolutions to which I have referred, and discussion on it was deferred because Mr. Ashcroft proposed presenting his paper.

It is not claimed by the Committee on Resolutions that the resolution before you goes any farther than to impress upon the government the necessity for listening to the opinions of the convention. It is impossible for this convention to say that the government must follow a rule laid down. All we can do is to express our opinions to the government and look to them to do their part. Later, at some political contest, you can express your views relative thereto. I have, therefore, taken the responsibility of moving this resolution expressing the desire of the convention that the government, by means they may think desirable, shall consider the subject fully and, having considered it, that they will take steps to remedy it. That is the reason, Mr. Chairman, that we present this resolution. (Applause.)

Mr. POOLEY.—As it is stated that this is not in affirmation of Mr. Ashcroft's paper, I would like it clearly understood that my previous remarks were based on the assumption that it was.

Mr. C. A. STOESS (Kelowna).—It seems to me that four years ago at Vernon we discussed the same subject. The government has had four years to consider it, and I therefore cannot see why we should waste time now. Why should not the government guarantee the bonds of any other industry which will do the province as much good as railways?

It is well known that within a few years, when the Panama canal is opened, we shall have thousands of immigrants where we have hundreds now in British Columbia,

and unless we are ready then, where are they going? By all means let the government take hold of this subject and do their duty towards the people in the Dry Belt. (Applause.)

CHAIRMAN.—You have heard the resolution. The resolution is carried.

Mr. BULMAN.—I would like to move a resolution along these lines, in addition which I think, gentlemen, is the expression of opinion of the farmers in this district

Moved by Thomas Bulman, seconded by O. J. Wegen:

Whereas the successful settlement of the Dry Belt of British Columbia is dependent upon an ample and permanent water-supply for irrigation purposes and in the efficient and economical distribution of water to all land capable of irrigation that can be supplied without undue expense; and

Whereas the present system of supplying water by joint stock companies in many districts serves only limited areas, and a large amount of first-class fruit and farm land is thus without a permanent or satisfactory water-supply; and

Whereas in the opinion of this convention it is desirable and will assist in the developing of the country and safeguarding of the interests of the farmers and fruit growers that might be supplied with water from a common source, that they have the power to organize for the acquiring of existing systems and water privileges generally;

Therefore be it resolved, that it is desirable that a scheme be formulated giving the inhabitants of districts served from common sources of water-supply the power to take over, control and operate for the benefit of all land in such districts all water records, irrigation companies and associations organized for purposes of supplying water, and that the Provincial Government be respectfully invited to prepare and present to the Legislature of the Province of British Columbia at its next session a bill providing for the establishment of water districts and for the organization of the inhabitants (being users of water) into corporate bodies, defining their powers, duties and obligations.—Carried.

CHAIRMAN.—It will be referred to the Committee on Resolutions along with Mr. Pridham's resolution relating to the appointment of a commission. Is there any further report from the Committee on Resolutions?

Mr. DENNIS.—The Committee on Resolutions beg to report Resolution No. 6, which reads as follows:—

That the government be asked to insert in the Water Clauses Act the following: That all plans of any irrigation works shall be subject to the approval of the government before any construction works are commenced, and subject to government supervision during construction, and that the government make an annual inspection of such works.

The committee reports to the convention with the note that the law as it stands provides that plans of irrigation works must be approved by the government before work is undertaken.

Mr. PRIDHAM.—The last part of the resolution is the part to be considered. Would you refer it back for that purpose?

CHAIRMAN.—Yes, but will you amend the resolution to conform to what you now propose? The committee reports the first part of your resolution already covered. Will you withdraw the first part or amend the resolution?

Mr. PRIDHAM.—Yes, I will do that.

CHAIRMAN.—Then you will be in order. Resolution is referred to the Committee on Resolutions.

Mr. DENNIS.—The Committee on Resolutions report Resolution No. 7, which reads as follows:—

RESOLUTION No. 7.

Moved by J. L. Pridham, seconded by Mr. Gregory:

That a clause be inserted in the Water Act making it compulsory that all companies or others using water for irrigation, mining or other purposes, shall keep their ditches, &c., free from noxious weeds.

CHAIRMAN.—You have heard the resolution. Carried.

RESOLUTION No. 8.

Moved by C. A. Stoess, seconded by H. A. Canaran:

That in the opinion of this convention it is advisable that in subdividing lands, the plans of which are to be registered, and which are to be irrigated and sold for cultivation of fruit or other market produce, the government should consider the relative importance of main trunk roads, accommodation roads and lanes or by-roads, also the physical features of the country with regard to such roads, and the future requirements for tram lines for transportation of produce.

Mr. STOESS.—The Land Registry Act was amended, but unfortunately a great oversight was made in discriminating between roads through subdivided lands for registration and town-site subdivisions. One thing in particular was that no lane should be wider than twenty feet. In subdividing fruit lands we have made several attempts to avoid having all roads sixty-six feet wide, and we have had promises—in fact, the company I belong to received a letter saying that under certain conditions they would allow a sixty-foot road instead of sixty-six feet. That was really nonsense, because conditions were totally against it. There are some roads that might be looked upon as part of lots, such as leading into a blind valley, where a twenty-foot road and probably a forty-foot road would not be sufficient to build a road on a steep sidehill, but a certain amount of judgment should be used in making the road allowance sufficiently narrow and not too wide for such a roadway.

Mr. PEARCE.—When I read over this first, I thought the clause referred more to the location of roads than to the width. I think that is just as important as the

width. Did the mover intend that the location of the road should conform? If so, I think the clause is worthy of honest thought. The only question is, does he make it clear enough as to the location of the road conforming to the physical features?

Mr. STOESS.—Yes, to conform to the topography of the ground.

Mr. PEARCE.—The grades might have something to do with it, as well as the location of irrigation ditches. Any tramway would have to take into consideration the physical features. Do you think the clause covers the point with sufficient clearness?

Mr. STOESS.—Yes, the government should recognize the necessity of it.

CHAIRMAN.—You have heard the resolution. Carried.

#### RESOLUTION No. 9.

Moved by J. C. Dufresne, seconded by E. Foley-Bennett:

Whereas in some of the semi-arid districts of British Columbia thousands of acres of splendid agricultural land are now lying idle for the want of irrigation; and

Whereas in most of these districts the land is held by small farmers who could not possibly afford to install complicated and costly irrigation systems; and

Whereas there is no doubt that in many of these districts artesian water in paying quantities could be obtained by drilling wells, say from 1,000 to 2,000 feet deep (in confirmation of which a six-inch hole recently put down some 1,300 feet near Princeton yielded a flow of artesian water measured at 97 miner's inches); and

Whereas after artesian water had been struck and the depth and cost of such wells ascertained, the farmers in the neighbourhood would then be in a position to figure on driving their own wells, thereby placing their lands under cultivation; and

Whereas important geological and mineralogical information could be obtained during the drilling of these wells which might lead to the opening up of such valuable resources as coal, gas, oil or precious metals;

Therefore be it resolved, that the Government of British Columbia be urgently requested to take the necessary steps towards putting down test holes throughout the province, and set aside the required funds for same.

Mr. DUFRESNE.—I think that resolution nearly explains itself. I have gone fully into the matter there and have only to state that it has been found feasible in many parts of the United States. At present large areas in California, Colorado, North and South Dakota and Texas are irrigated from artesian wells. I do not think irrigation by that method has been tried in British Columbia except by one or two bore-holes. I think the main reason why we have not had more attention paid to wells in this province is because it is a young province and we lack the experience and the initial outlay of capital. The individual farmer would have to obtain the necessary funds, and if he got water, all right, but if not, he would be out a large amount of money

and probably have to sell out. If he struck water, his neighbours around would all benefit by the information; so it seems to me that the government could see the way to placing artesian wells in some districts, where there is only a small creek and a large number of irrigable farms on that creek and not sufficient water. The government might put down test holes on a certain farm and that owner would take it over from the government if it was found a success. If water was not obtained, the government would no doubt benefit by a certain amount of geological information.

Mr. FOLEY-BENNETT.—I don't think I can add very much to Mr. Dufresne's remarks, because I might continue a long time giving accounts of experiences in New Zealand and Australia. I am sure this resolution will appeal to this intelligent audience.

Mr. FULTON.—For Mr. Dufresne's information, I might say that twenty-two or twenty-three years ago the then government of the province expended a considerable amount of money in this very way. They sank artesian wells at several places without any success; so it is not a new thing in this province. Maybe they did not try in the right districts, and, if the experiment is tried with success elsewhere, it would be a very advantageous thing. I just wished to inform the convention that the government has spent money along this very line already.

CHAIRMAN.—You have heard the resolution. Carried.

#### RESOLUTION No. 10.

Moved by C. E. Lawrence, seconded by Mr. Stobart:

Whereas the consummation of the work of this association in British Columbia requires special attention and effort in accordance with the conditions of the province;

Be it resolved, that a committee of British Columbia delegates, with a local secretary, be appointed to deal with irrigation, dry farming and forestry subjects, keeping in touch with the agricultural and forestry departments of the federal and provincial governments, and the permanent secretary and executive of the association at Calgary.

Mr. LAWRENCE.—That resolution was formed as the result of conversations with a good many of the British Columbia delegates present, and we think it would be a very great assistance to the executive and to the secretary located in Calgary. Undoubtedly there are conditions in semi-arid districts in British Columbia which present peculiar features which do not obtain in Alberta, and if there has been no particular expression of opinion on those lines so far, it was simply because we did not want you to think that we are not satisfied with the management, or dissatisfied with the attention you are giving to matters in this province, or that we wished in any way or shape to get the thin edge of the wedge in order to make a cleavage. That is farthest from our thought; but we do think in this large province, with its peculiar conditions, it is necessary to have an executive such as is outlined in that



resolution, so that the responsibility of that kind of work should be laid upon a committee in this province, acting in conjunction with our able secretary.

CHAIRMAN.—You have heard the resolution. Carried.

#### RESOLUTION No. 11.

Moved by R. M. Palmer, seconded by A. E. Ashcroft:

Resolved, that in view of the many important questions concerning irrigation matters in British Columbia which require public consideration, it is advisable that a special meeting of the association shall be held in British Columbia in December, 1912, and that the Executive Committee is hereby authorized to convoke the meeting on a date to be arranged.

Mr. PALMER.—I think the resolution itself will convey to the meeting the reasons why it is desirable to hold an additional session. From the discussions which have already taken place, it is evident we have a vast number of questions which cannot be dealt with wholly at this convention. I think, therefore, that it would be a good thing that an additional session should be held, possibly in December, and whatever resolutions or conclusions are reached could be placed before the government before the approaching session of the legislature.

CHAIRMAN.—You have heard the resolution. Carried.

#### RESOLUTION No. 12.

Moved by W. J. Elliott, seconded by W. H. Fairfield:

Whereas the committee in attendance at the Nineteenth National Irrigation Congress report that the attendance upon that convention is a step in the right direction in bringing closer together the irrigation interests of the Dominion of Canada and of the United States, and thereby bringing about a better understanding of the use and proper distribution of irrigation water;

Be it therefore resolved, that it is the sense of this convention that the executive appoint the secretary and two delegates to represent the Western Canada Irrigation Association at the Twentieth National Irrigation Congress to be held at Salt Lake City the latter part of September and the beginning of October, and that the delegates make a special report of any matters that might be of especial interest to the Western Canada Irrigation Association at their next year's meeting.

Professor ELLIOTT.—Those of you at the convention last year will remember we appointed a committee to attend the Nineteenth National Irrigation Congress of the United States. Those men who visited that convention report that a great many ideas were given out there that might be used to advantage in the west in our association. The idea of this motion is that this convention appoint a committee to attend the National Irrigation Convention and to bring back to this convention at



Shade-grown Sumatra Tobacco, and the Plantation of the British North American Tobacco Company, Ltd., Kelowna, B.C.



Mr. Holman's Tobacco Harvest, Kelowna, B.C.

our next year's meeting any special ideas that may be of interest to us here in the west.

CHAIRMAN.—You have heard the resolution. Carried. The Special Committee with reference to the constitution has reported that the clause with reference to membership read as follows:—

‘Three delegates each for all agricultural, horticultural, forestry and live-stock associations, and irrigation and affiliated associations, in British Columbia, Saskatchewan and Alberta, which are incorporated or recognized by the governments of their respective provinces.’

Shall that amendment pass? Carried.

Shall the constitution as amended pass? Carried.

The convention will now adjourn until eight o'clock this evening. in this hall.

### WEDNESDAY EVENING SESSION.

The convention reassembled at eight p.m., when a moving picture exhibition of irrigation scenes was given, at the close of which Dr. Samuel Fortier delivered the following illustrated lecture on irrigation:—

#### HINTS AS TO THE UTILIZATION OF THE WATER RESOURCES OF BRITISH COLUMBIA.

By S. FORTIER,

Chief, Irrigation Investigations, United States Department of Agriculture.

LADIES AND GENTLEMEN,—Hon. W. R. Ross has stated the object of my visit to this province. I am inclined to think our worthy president had other reasons for inviting me here. He wished me to see at first hand some of the beauties and resources of this New Columbia. I find in this corner of the Dominion hidden away behind the Rockies and facing the broad Pacific a territory larger than the States of California, Oregon and Washington combined. I never dreamed that nature had stored up so much wealth in this region. You are to be congratulated on having for your own needs and the generations which will follow you waters teeming with fish, forests of valuable timber, mines of coal and ores that are awaiting development, limitless cheap power from lakes having torrential outlets, rich soils and good water-supply and a splendid opportunity to utilize these resources by establishing manufacturing and providing cheap transportation facilities on inland waters and the nearby ocean. In travelling up and down your island lakes and rivers and noting the scenic beauties of these waters surrounded by green forests and backed by lofty mountain ranges, I have become convinced that your most valuable asset as a province consists in alpine scenery, coupled with a cool invigorating summer climate. Of the 95,000,000 people who live and toil south of the 49th parallel of latitude a large percentage are

now sweltering in heat. Only the rich and well-to-do can afford to go to Europe or some other distant land. If you were not so modest you would tell them something of British Columbia and invite them here to spend their summer vacation.

The other day the *Victoria Colonist* referred to Premier McBride and the Minister of Lands as being engaged in unrolling the map of British Columbia. As the natural wealth in forests and mines, soils and waters is revealed, one wonders why so rich a province should be the last to be developed. The forest service has been organized, and the work of caring for this important industry placed on a substantial basis. Provincial land surveyors are reaching out to new agricultural lands to the north and are blazing the trails for the civilization which is sure to follow. The necessary measures for the utilization and protection of the water resources are also being carefully considered. I trust these leaders will be retained in office sufficiently long to enable them to round out and complete the great tasks which they have undertaken.

In viewing this province from an agricultural standpoint, much of it resembles localities to the south. Place, for example, in the midst of the grain and clover fields of the Gallatin valley, Montana, a beautiful mountain lake and you have a picture of the upper Columbia valley around Windermere. It is true that the Columbia valley is several hundred miles farther north, but, as it is 2,000 feet lower, the climate is milder. Again, in travelling from the boundary up the Okanagan river to Penticton, I noticed the same wild flowers and shrubs that one finds around Brigham City, Utah, the banner peach district of the Rocky Mountain region. Here, too, the influence of north latitude is overcome by a lower altitude. Brigham is about 4,400 feet above sea-level, while the Okanagan lake is only 1,125 feet.

Mr. Ross had, perhaps, another purpose in view in asking me to come here. He was aware that I had a fairly good knowledge of the many mistakes which we have made in the irrigation of western lands, and he wished me to steer you clear of some of the pitfalls which have beset our path. So in the short time allotted to me I shall try to tell you something of the road we have travelled and point out the rough as well as the smooth sledding.

Your Water Act of 1909 was a surprise to those interested in irrigation in the United States. It heralded the announcement that British Columbia in one leap had crossed the barrier lying between the crude laws and customs of the placer miner and the most advanced legislation of modern times. In the new irrigation code which will be submitted to the next California legislature certain provisions are modelled after the Water Act of British Columbia, thus the leading irrigated state of the Union is willing to learn of a province in which this industry is in its infancy.

In our water legislation we have been content to begin with irrigation and to provide by degrees for the control and administration of other uses of water, such as domestic water-supply, storage reservoirs and water-powers. Your law-makers have deemed best to include in one Act all purposes to which water and water resources may be applied. To attempt at the start to pass so comprehensive a measure has resulted in some confusion on the part of water-users, and has rendered administration somewhat difficult. It is not as yet a complete law. There are gaps to be filled and weak places to be strengthened, but such improvements can be brought about in time.

For nearly half a century water has been taken from the streams of this province and little attempt has been made to determine the quantities, define the rights or establish the priorities. Others have secured records of water without having expended a penny in the construction of works to utilize the waters claimed. I am informed that there are about 5,000 of these claims still unsettled or pending settlement. Some of these are involved in complications which would puzzle the members of the Privy Council to unravel. Too hasty action in settling these claims may only result in litigation. The Minister of Lands is considering not only this feature, but also the necessity of cleaning up old records, and the necessary force is being organized to perform this task. I, therefore, ask you to be patient until this new organization, the character of which will be outlined this evening by my associate, Mr. Grunsky, has been given a chance.

#### THE PREVENTION OF WATER-RIGHT LITIGATION.

Litigation is the curse of every irrigated country, and in laying the foundation for this industry no pains should be spared to safeguard the province against this evil. Whenever the interests of one man encroach on those of his neighbour trouble is likely to ensue. Land lines and boundary fences have been the most frequent causes of dispute among eastern farmers. To such an extent is this true that the saying 'good fences make good neighbours' has become proverbial. Such suits are uncommon in the west, but, unfortunately, the western farmers have spent a large share of their hard-earned profits in costly law-suits. This is largely due to the unstable nature of water. It is not to be expected that the melted snow on the crest of the range will flow to each rightful owner without some supervision and control. It would be unreasonable to expect that the express packages in a car would reach their destination without any further effort on the part of the Express Company.

For more than twenty years Wyoming has been delivered from the evil effects of controversies over water-rights. The irrigators have lived in peace, not on account of the angelic sweetness of their dispositions, but because the state has endeavoured to remove all causes of disputes and controversies. The cardinal principle of Wyoming's administrative system may be summarized in the old proverb, 'An ounce of prevention is better than a pound of cure.' Inasmuch as British Columbia has seen fit to embody in its Water Act many of the essential provisions of the Wyoming law, it, too, should be delivered from the curse of water-right legislation. The chief difference between the two is that this province has not as yet provided an adequate system of supervision and control, but ample authority for such is provided by the Act.

#### MAKING WATER APPURTENANT TO LAND.

In the earlier stages of irrigation development in the United States water was dealt out in a careless and liberal fashion. Owing to its cheapness and abundance few restrictions were put upon its use. It was frequently bought and sold like any other commodity, and very rarely attached to the place or use of the land which it irrigated. Rights were transferred from one tract to another, companies were free



to apply the water which they had acquired to any land and supplies were conveyed from one watershed to another. These customs were continued long enough to convince the leaders of this industry that they were pursuing the wrong course. Such customs encouraged speculation in water, disturbed adjudicated rights and rendered extremely difficult both the administration and protection of valid rights. The appurtenancy of water to land may be regarded as the chief cornerstone of every sound irrigation code. British Columbia is to be congratulated on having given so prominent a place to this essential feature. The United States is fast remedying former mistakes. In many of the states the water is now wedded to the land, and in all reclamation work done under the Carey Act and the reclamation service water is made appurtenant to land. In guarding against the mistakes formerly made by the western States, this province has perhaps gone to the other extreme. If I am not mistaken the Water Act makes no provision for the transfer of a water-right from one tract of land to another. This makes the law too inflexible. Cases will arise where the interests of all concerned will be best served by transferring rights. Such transfers should be made, however, only under the strictest regulations, and not until the interests of the one desiring the change, those of other water-users on the same stream and the best public policy have been duly considered. A less rigid application of the doctrine of appurtenancy is likewise needed in dealing with co-operative canal companies, irrigation districts, and municipalities which construct, maintain and operate works to furnish water to individual users. I shall have occasion to refer to such reorganizations a little later on.

#### RIPARIAN RIGHTS.

We have found it extremely difficult to harmonize the common law of England which gave certain privileges to river-bank owners with the miner's law of 'first in time, first in right.' As a result some states do not recognize the riparian doctrine, others have accepted it, and still other states like California are endeavouring to steer a middle course by recognizing both. The trend, as you know, is away from the riparian doctrine in the direction of priority and beneficial use. Your law grants certain privileges to riparian owners in the case of water for domestic purposes, but I am not certain how this provision will work out in practice. Such privileges may result in a large waste of water in attempting to divert from a creek or small stream a fraction of a miner's inch to supply the domestic needs of each of a number of families living along the banks. Under the Act the controller has the power to compel such users to pipe their supply, but large quantities may be lost in trying to maintain a flow in the channel of the stream at a reasonable distance from each riparian owner's dwelling.

#### ROTATION IN WATER DELIVERY.

What precedes brings up the question of delivering water in the most economical way. Much of the available water-supply of the province is found in the mountain creeks which flow bank-full when the snow melts and carry little or no water in the latter part of the irrigation season. It will be found impracticable to divert a con-

tinuous flow from many of these creeks during the low-water period and at the same time prevent excessive waste. A system of rotation in service will have to be adopted. It is the experience of every irrigator that a large head is preferable to a small one in that it saves water and time and is otherwise more effective. This method of delivery has been adopted in all but one or two western states, and it will soon be the universal practice. By it the man who waters only five acres can use as large a head as the man who waters fifty. The limit is placed on the time of use rather than on the quantity delivered. About the smallest irrigation head used under systems in the United States consists of thirty miner's inches.

In the case of a creek in which the July flow does not exceed this amount, the holder of the prior record should not be permitted to divert the flow every day of the week to the detriment of his neighbours. The administration of the Act should be made so elastic that water-bailiffs would have the authority to compel first-right holders, after their needs have been supplied, to close their head-gates at stated times and to keep them closed until inferior rights have been served. The holders of superior rights are entitled to first consideration in both the time of delivery and the quantity delivered. They should not, however, be permitted to divert water at will. Such a privilege would be certain to be abused, and the best use of the water resources of the province thereby greatly curtailed.

#### DUTY OF WATER.

The proper amount of water to apply in irrigation has been a very difficult question to settle in the western states. This has been due in part to the large quantities which were at first thought necessary. In some cases the maximum duty of water was fixed by legislative action and was made general throughout an entire state. Thus twenty-two years ago the legislature of Wyoming fixed the duty of irrigation water at one cubic foot per second for seventy acres of land, and all the adjudications have since been made on that basis. This has become the weak feature of an otherwise good code, and if it is not remedied will result, I fear, in needless waste of water.

In other cases the courts have fixed the duty of water and they have been even more liberal than the legislatures. Before water became scanty and valuable it was not uncommon for the courts to grant a miner's inch to the acre. This was the situation which confronted the west about fifteen years ago when our branch of the United States Government undertook to investigate the subject. Not only the irrigators but the courts and the state legislatures were seemingly all in favour of a liberal use of water. It devolved on us to convince them that they were wrong, and so a systematic campaign of experiments, demonstrations and education was begun and carried out. The results have been better than were anticipated. Porous channels have been lined, the surface of fields better prepared, water more skilfully distributed and supplied, and in many cases the same quantity which once served only one acre now serves three. It should also be stated that this greater economy has been brought about without any diminution in the quality or quantity of the yields. By means of scientific rotation, intensive farming and a more skilful use of water the products from the soil have been greatly increased.



Work at South Kelowna Land Company Dam, Kelowna.



Steel flume of Kelowna Irrigation Company Ltd. watering 'Glenmore' property of Central Okanagan Lands, Ltd.

Now it seems odd that this question has given you so little concern. You propose to have three members of an adjudication board determine off-hand and for all time to come just how much water is needed for each of the thousands of irrigated farms that are scattered over this immense province, where one meets wellnigh every extreme in climate, soil and topography. I have grave doubts as to the wisdom of such procedure because of the fact that so little information is now available on which to base correct estimates. On the other hand the citizens of British Columbia are urging the government to take quick action in settling all existing claims. In this dilemma about the only course open is to establish all priorities and to grant to each holder of a perfected water right as much water as he can put to a beneficial use. In granting such rights the interests of the province should be safeguarded in a number of ways. These may include the designation of the volume of water granted in acre-feet per acre for the season, the portion of the year in which the water is to be used and the right of the province to deliver water in rotation in lieu of continuous flow. Meanwhile a systematic study of water in its broader aspects should be begun and carried through a period of years. In planning and conducting such investigations the experience gained by the United States may prove of some value. On behalf of the United States Government I take pleasure in announcing that every fact we have obtained and all the experience we have gained on this and other subjects connected with irrigation will be freely placed at your disposal. A post card addressed to our department will be quite sufficient to secure any publication available for free distribution. In this subject of irrigation we know no north or south. We are all working for the cause of humanity.

#### MAKING PRIORITY AND BENEFICIAL USE THE BASIS AND MEASURE OF A RIGHT.

As I have stated, in the early days of settlement in the western states water was often carelessly and wastefully used, by both the miner and the farmer. Many had but a vague idea of the volume of water. This is seen in looking over the early records. The recording, too, was done in a very loose way. As time went on, water became somewhat more valuable, yet the states did not seem to place much value on this natural resource. It seemed to be free to everybody to take without much supervision or control; besides, it was as easy and as cheap to post a notice and file a claim for 1,000 as for 10 miner's inches. In consequence excessive quantities were applied for, the large majority of which were never utilized, and the act of recording furnished little protection to the bona fide user. Excessive claims on over-appropriated streams became the laughing-stock of communities, and the courts could not place much dependence on such evidence in granting decrees for a definite quantity of water. They were, and are, chiefly valuable in settling priorities. As water records fell into disrepute, more and more dependence was placed on beneficial use. In looking over the decisions of the Supreme Courts of the western states on water cases, one finds that priority and beneficial use are the essential features in the adjudication of rights to the use of the water.

The Water Act of 1909 and the amendments thereto go fully as far as any of our water laws in upholding the doctrine of prior appropriation and beneficial use, and in the settlement of old claims beneficial use must be accorded due considera-

tion. In this connection my advice is to spare no effort and if need be to make sacrifices to prevent speculation in water. As a province you have already suffered much from the baneful effects of speculation in land. Let the water be free for your children and their descendants.

I fail to see how speculation in water can be prevented if the government permits individuals and companies to hold valuable water records indefinitely without using them or making any effort to construct the works necessary for their proper utilization. Beneficiary use is already interwoven in your Act. It only remains for your government to write it in large letters over the lands and waters held by speculators throughout the province.

#### MORE AGENCIES NEEDED.

In my humble opinion British Columbia has too few agencies for the reclamation of its arid and semi-arid land. With a few exceptions all development thus far has been accomplished by individuals and commercial canal companies. Large areas have been reclaimed by similar agencies in the States, but the present attainments would not have been possible without the aid of other means. For half a century co-operative irrigation enterprises have been the mainstay of the west; in fact much of the prosperity of a dozen western states is directly traceable to co-operation, not only in irrigation but in other industries.

In 1909 more than one-third of all the land irrigated was under co-operative enterprises. The figures also showed that these systems which were capable of irrigating over 6,000,000 acres in 1910 had been built at an average cost of about \$13 per acre.

It is likewise true that many enterprises which started out as commercial companies have been purchased by the water-users and converted into co-operative undertakings. So, too, all reclamation and Carey Act projects and many of the commercial enterprises are eventually to become co-operative in character. Thus in the course of a few years fully ninety per cent of the total irrigated area will be controlled by those who use the water.

Although commercial canal companies have been partial failures in the States from the investors' standpoint, it by no means follows that a similar fate awaits like companies here. I am merely using our experience as an argument in favour of devising measures to place the control of irrigation works in the hands of water-users. This course in my judgment cannot be too strongly advocated.

Again, that quasi-municipal form of organization known as the irrigation district is another agency which has been used to good advantage in the reclamation of arid lands. You are familiar with its essential features, so I need not take time to describe them. The irrigation census taken two years ago showed over half a million acres were actually irrigated within the limits of irrigated districts. The works constructed at a total cost of nearly \$22,000,000 were capable of irrigating 800,000 acres.

There is a growing sentiment in British Columbia in favour of local control of irrigation enterprises. The experience of the western states has clearly demonstrated the wisdom of this course, and in viewing conditions from our standpoint the movement should be encouraged. In fact I do not believe it can be suppressed, and it is



the duty of such conventions as this to see that it is kept in right directions and within safe limits. Recognizing the importance of this agency in the western states, I requested one of our ablest men, Frank Adams, of California, to make a study of the laws bearing on irrigation districts and how these laws operated in practice. In a few months his report will be published and it will be freely placed at your disposal. In devising ways and means to place the control of irrigation largely in the hands of those who own the land and use the water, differences of opinion will arise. The officers of many of the carrying companies, as well as the land and water companies, are willing to dispose of their properties, but, as I understand it, they wish the province to take a hand in the deal. They wish the province to loan either its money or its credit to the purchasers of such properties in order to render the capital invested doubly secure. We must all admit that from the viewpoint of the corporations a transaction of this kind would be highly desirable, but would it serve the best interests of the water-users and the province in general? I can perhaps throw some light on this question by a further reference to our experience. In all of the millions of irrigated acres to which I have referred, which have been reclaimed by individuals, co-operative companies and districts, it may be said that not one dollar has come from the governments of the western states. This gigantic task has been accomplished without assistance. Out of a total of fifteen million acres under irrigation fully ninety-six per cent have been reclaimed by private enterprise unaided by either the states or the federal government.

More than this. The works now built for the utilization of water are far in excess of the present needs of bona fide settlers. To-day water has been furnished to nearly 6,000,000 acres of rich arable land, but neither the land nor the water is utilized for lack of settlers. In other words, the construction of irrigation works is at least ten years in advance of settlement and use.

Let us assume that the province does give its money or its credit to aid irrigation enterprises. If it extends aid to one it cannot well refuse, under British fair play, similar aid to scores of others presenting as strong claims. As a result the provincial treasury would soon be drained, the borrowing capacity of the province impaired and an abnormal development created in the construction of irrigation works far in advance of the clearing of land and the planting of crops.

This would likewise be done in the face of another kind of development which is quite as certain to come. Under the law the water-record holders will be compelled to begin soon to construct works to utilize the water claimed and to proceed with this construction until completion or else forfeit their rights. I am inclined to the belief that it might interfere somewhat with the record holder who is trying to perfect his title to water by clearing a few acres every season if the government was to lend financial assistance to companies and municipalities now in possession of constructed works. (Applause.)

CHAIRMAN.—Mr. H. W. Grunsky, in charge of irrigation investigations in Oregon, and working under Dr. Fortier, will speak to us on 'Enforcing the Water Act.'

## ENFORCING THE WATER ACT.

By H. W. GRUNSKY.

Mr. CHAIRMAN, LADIES AND GENTLEMEN,—It has been suggested that I outline briefly the main features connected with the acquirement and supervision of water rights under an up-to-date law.

Such laws usually lay emphasis on three things. The first of these is the defining of existing rights by some special board or court; the second, greater caution in granting new rights; and the third, a system of supervising and protecting rights after they are once clearly defined. The Water Act of 1909 has paved the way for British Columbia in all of these lines, especially in the first two named, i.e., the determination of old rights, and the acquirement of new rights.

Problems arising out of the use of water are not solved, however, when a modern Act is passed. Much latitude is permitted to officials who carry its provisions into effect, and it is with this phase of the subject that my remarks deal.

In British Columbia, as in all the western states, the early water records are encumbered by a heterogeneous mass of filings, many of them for such absurd quantities of water as to be utterly meaningless. It is not in the province of this paper to discuss how such a condition arose. It is sufficient to say that there can be no public control of waters until all vested rights are clearly defined and recognized by the government.

## CLEANING UP OLD RIGHTS.

In a province of the size of British Columbia the determination of the nature and extent of such rights upon every stream and in every watershed is a large undertaking, and must of necessity extend over a period of years. It requires the existence of a special board or court, which operates in connection with the Water Branch and has for its primary object the adjudication and cleaning up of old rights. Its decisions must be based upon reliable land surveys and water measurements.

## COLLECTION OF FIELD DATA.

The first step, after all known records on any stream are listed and classified, is the collection of the requisite field data for each record, by men trained for this purpose. Such surveys are usually advertised in advance, for it is a matter of vital interest not only to the water-users on the stream but to the public. An examination is made of the character, extent and capacity of existing works, and of the location and extent of irrigated and irrigable lands.

Of equal or superior importance is the measurement of stream flow at various times each season, and for as many seasons as possible prior to adjudication. This hydrographic work must continue irrespective of special adjudications; for if the state or province is to dispose of new rights intelligently, it must know what it has on the credit side of the account. This means that a permanent staff of competent engineers must be connected with the Water Branch.

Maps are then prepared showing the stream system, the point where the water is to be diverted, the place of use, the capacity of the head-gates, flumes, pipes or

canals, and if an irrigation system is concerned an outline of the irrigated and irrigable area. Too much attention must not be given to the mapping of irrigable areas and works in those cases where a record was obtained some years ago, and no improvements have been made by the holder. Such a party deserves no more attention than the one who applies to-day for a new right, and the government is under no obligation to spend time in laying out his works for him. In such cases, however, sufficient data should be gathered by the field men to enable the board to determine how much time should be allowed the party whose case is under consideration, to begin work upon his ditches, flumes, dams or other structures, and how long should be allowed the party to complete his work and bring his lands under irrigation. In every case, too, there should be a rough estimate of the acreage of irrigable lands. The principal attention, however, should be given to works already constructed and lands actually irrigated, and to stream measurements. The character of the soil and subsoil, as well as the crops grown, the length of the irrigation season, the precipitation and climate, and duty of water studies should all receive due consideration.

#### MAKING CLAIMS.

The second step in the adjudication of rights is the gathering together of written statements of claim from all water-users on the stream or in the affected area. A member of the board may meet the claimants, or the board's secretary or some other person familiar with the Water Act may go as an advance agent of the board for the purpose. Such meetings are duly advertised to be held in all the smaller and larger towns, and an endeavour is made to notify every interested party in person. Here the board or its agents first meet the water-users face to face. Time should be taken to assist them in the preparation of their claims and explain the operation of the Act. It is important that maps and other data collected for the board's use should be exhibited at these meetings, and one of the questions to be asked and answered by every water-user should be: 'Do you approve of the official map of your lands and works as submitted?' Thus the claimants will not require the services of a lawyer in filling out their claims; and their estimates will be for the most part conservative when they are confronted with the maps and other data collected by the engineering staff.

#### PUBLIC INSPECTION.

The next step is the period of inspection of claims. Any interested party is entitled to know the nature and amount of the claim entered by any other party. A time is therefore fixed when and where the evidence taken will be open to inspection. Each claimant will be notified, and all parties will be allowed every opportunity to inform themselves regarding the claims of others. This inspection is held in the larger towns, and generally extends over a period from five to ten days. In some cases it occurs immediately upon the termination of the hearings for the collection of claims, while in important cases, involving many litigants in one decision, time is required for a proper classification and segregation of claims before they are opened to inspection. This period is an important step in the process. It gives opportunity for the coming together of litigants and for the meeting of minds. Many voluntary

compromises will occur during this interim, if time is given. It is evident that it should not be expected of any party that he must give snap judgment upon the mere reading of a claim in open court, whether or not he will enter a contest. He should have time to view all the claims which may be interrelated with one another, and he may then carefully consider whether he will dispute another's claim or not. So, too, the claimant after due consideration may decide to withdraw his claim and enter a modified claim.

#### CONTEST HEARINGS.

If, however, the parties cannot come to an agreement, contests are filed. The time allowed for this purpose is brief, but usually extends five to ten days after the close of the period of inspection. Thus all the parties who have any possible grievances have ample time in which to make them known. The board next fixes a time and place for the hearing of contests, if any, and all interested parties are notified. It is not necessary for the full board to sit in any but the more important cases. Decisions of individual members are, however, subject to review by the full board. At the contest hearing the fullest opportunity must be given for the taking of evidence from any parties brought in for that purpose. It is a court proceeding, but is usually carried on in a more or less informal way. All material evidence should be taken by a stenographer. When the contest hearing is completed, licenses are issued by a state or provincial official in conformity with the board's order to parties who have completed their appropriations; and to those who have proved incomplete rights, a permit is issued giving them a definite time in which to begin and complete their works and apply the water to the land.

#### NEW RIGHTS.

Coming now to the second point on which modern water acts lay emphasis, the more cautions granting of new rights, I will outline very briefly the usual steps in the process. It is needless to say that the state must exercise the same (or a greater) degree of care in this field as in the inspection and determination of old rights.

The candidate for a right either mails his application directly to the state engineer or comptroller or files it with some local official who forwards it. This first application need not be according to any particular form, and is often in the shape of a letter, yet if the applicant afterwards proceeds to perfect his rights, his priority dates from the receipt of his initial application. In those cases where it does not contain all necessary information, blank forms are mailed to the applicant which must be properly filled and returned to the central office in a definite period of time. This time is usually about thirty days. At the same time the applicant must file a map or sketch of works to be constructed, and, in important cases, detailed plans and specifications. Filing fees to cover cost of a proper examination of the scheme by the state engineer or comptroller, as the case may be, must accompany the completed application. The official named looks into the scheme, and, if there is any doubt, calls upon his division engineers for all needful information. The data which are already collected on stream flow are helpful at this point, or special investigations may be authorized.

## PERMITS.

When satisfied that unappropriated water exists for the purpose named, and that there can be no menace to the safety or welfare of the public from the proposed scheme, the application is approved and a permit is granted. This permit is conditioned upon the commencement and completion of works and beneficial application to the lands within a specified time. The time allowed for commencement of actual construction is usually one year. The time allowed for completion and beneficial application is usually five to eight years, or may extend even beyond. This time may also be extended by the state engineer or comptroller when good cause is shown therefor. Otherwise the water must be completely applied within the time stated in the permit and proof furnished of such appropriation. When such proof is furnished, an inspection is made through the proper division engineer. This officer submits his report, which, if favourable, constitutes final proof. A water-right certificate thereupon issues to the party. Thus the procedure is guarded at every step. The danger of rights being acquired where there is no use, or for a greater amount than can be beneficially used, is obviated.

## PROTECTION OF RIGHTS.

A third and most important part of a modern water act is that which deals with the supervision and protection of rights after they are established. It is evident that society cannot protect an individual in a right until that right is clearly defined. This fact accounts for the shortcoming or total absence of supervisory systems in the past. So long as the water-rights of a province or state are in a more or less chaotic condition, it is useless to ask for government supervision and the policing of streams. Water is an elusive substance at best, and, since it is only the use thereof which becomes private property, the necessity of defining that use with such exactness as to make rights in water as secure as rights in land becomes apparent.

British Columbia has passed an Act which not only provides for defining the limits of existing rights, but makes it possible to guard closely the acquirement of new rights, and has thus paved the way for a system of supervision and protection of rights.

Water-masters or bailiffs must be appointed for this purpose who have all the power of the province behind them. They will have authority to close and lock head-gates, prevent waste of water, and make arrests where necessary. Local engineers, usually called 'division engineers,' must be on hand to measure the capacity of streams and ditches and to define the proper duty of water. In case an agreement cannot be reached, parties may appeal from the decision of the water bailiff through the division engineer, and from that of the division engineer to the state engineer or controller. Water-masters are given copies of decrees rendered by the Board of Adjudication and certificates issued for newly perfected rights. It is only vested and clearly defined rights which can be protected by the police power of the state. Here, then, lies the necessity for every water-user in the province to have his rights defined and to understand that the Water Act is passed for his benefit and protection. (Applause.)

In the absence of the writer, Professor A. H. D. Ross, Consulting Forester to the Canadian Pacific Railway, read the following paper on



## THE RELATION OF FORESTRY TO IRRIGATION.

By R. D. PRETTIE,

Forestry Superintendent, Canadian Pacific Railway Company's Department  
of Natural Resources.

As water is the common property and the equitable possession of all, the prime necessity of life, and the primary resource upon which depends the ultimate basis of all land values, its equitable distribution is, therefore, the most sacred trust confided by the people in their chosen representatives and officers. Its use has transformed valleys, long vacant, into prosperous and populous agricultural communities and has created hundreds of cities, towns and villages, many of which have been financially and commercially great. As in the notable case of Egypt, it has brought to the remotest parts of the desert the certainty of a sure reward for intelligent and skilful labour. The student of economics recognizes no facts more clearly than the close relationship existing between a country's various industries and activities and the natural resources that ensure their continued growth and prosperity.

In no case is this more true than in the relation between irrigation and industrial development in those sections of a country where irrigation is a prime necessity to any development whatsoever.

In the case of our western irrigation policy, where the main idea is to bring under cultivation lands that receive too little rainfall for the profitable production of crops, the influence of the forest is fundamental and indispensable. The basic demand, and the all-important underlying dependence of western agriculture upon irrigation, requires that we must protect the forests that conserve the moisture.

In the same way, the relation between forestal development and adequate irrigation is equally significant.

The history of all nations, and of all ages, shows that the forest is the natural and most efficient regulator of the flow in streams, and that when it is removed disastrous floods inevitably follow. These result in erosion of the soil, the failure of agricultural crops and a general impoverishment of the people.

The evil effects of forest destruction are profoundly marked in the older Asiatic and European countries, where the demand of the population for wood supplies caused the destruction of mountain forests. France is now spending an enormous sum of money in an effort to reforest denuded hillsides, even going so far as to construct walls of masonry to hold back the soil. The natural result of the excessive and reckless exploitation of the forests of the French Alps following the Revolution was that France soon found she had eight millions of acres (nearly eighty times the acreage of the cultivated fruitlands of British Columbia) of once fertile land rendered useless for farm purposes. So far, fifty million dollars have been spent in the work of repairing the damage, and fully one hundred million more must be spent before the restoration is complete. If the Canadian people are wise in their day and generation, they will surely profit by the experience of southern France.

A splendid example of the value of forest conservation is furnished us in the case of the Mississippi river. The flood which recently swept through the lower valley inundated towns, paralyzed business and destroyed agricultural prospects, the value of which totals millions of dollars, to say nothing of the loss of human life.

This calamity was largely due to the misbehaviour of the Ohio. The states bordering on the Ohio have not handled their forests carefully and, consequently, the water from the rain and spring thaws was not held in check. The forests that formerly served as checks are gone, so the rivulets and streams suddenly increased in size and wrought great destruction.

Later on, loss arises because of the lack of water when most needed, owing to the absence of natural reservoirs. Thus the reckless slashing of the forests from the mountain slopes results in:—

1. Increasing and excessive floods.
2. Lengthening of low-water periods.
3. Deposition of large quantities of mountain debris, which covers the lower fertile lands.

This shows how close is the relation between the forest cover and stream flow.

The value of the forest in controlling water-flow consists not so much in the trees themselves, as in the ground-cover which they create, which cover is seriously affected by present methods of lumbering. Logging operations and injudicious clearing, which have been up to the present, unfortunately often followed by fire, destroy the absorptive layer of the soil, leaving nothing to retain the moisture. Hence a considerable part of the rain falling during storms runs off the land surface, erodes the soil, renders the water turbid, gathers into destructive floods and causes wide variations in flow.

On the other hand exploitation by the methods of conservative lumbering overcomes and eliminates these dangers to the dependent agricultural interests.

#### EXTRACTS FROM THE FINDINGS OF CERTAIN INVESTIGATIONS.

J. B. Lippincott, Supervising Engineer United States Reclamation Service, gives a concrete example of the influence of forest-cover on stream-flow. He says: 'Two branches of the Yuba river, in California, afford an interesting comparison. The north fork has a drainage area of 146 square miles. On September 1, 1903, the stream in that branch of the river was flowing 113 cubic feet per second. The drainage area was well timbered and had not been extensively burned or logged over. The south fork of the river has 120 square miles of drainage area. Most of it had been cut and burned over. The normal condition of this branch was dry for 120 days out of the year in which observations were made.' (This branch is only separated from the north by an east and west ridge.) . . . 'A number of storage reservoirs have been built in the deforested tracts tributary for mining and power purposes. We have, therefore, two forks of the same river, draining approximately equal areas, one with a well sustained flow, and the other practically dry in the summer. One basin is timbered, the other denuded, and in the denuded area a number of storage reservoirs have been built, possibly to compensate for the destruction of the forests.'

James Wilson, Secretary of Agriculture for the United States, found that a mountain watershed, denuded of its forest cover, with its surface baked and hardened by exposure, will discharge its fallen rain into the streams so quickly that overwhelming floods will descend in wet seasons. In discharging in this torrential way, the water carries away great portions of the land itself, deep gullies are formed, sand,

gravel and stone are carried down the stream to points where the current slackens and a silting up of the reservoirs results. This silting up makes uncertain any reservoir system outside the limits of the forested watershed.

The United States Waterways Commission, after a very exhaustive study, came to the following conclusion: 'Whatever influence forests may exert upon precipitation, run-off and erosion, it will evidently be greatest in mountainous regions. We favour the prevention of forest removal on mountain slopes, wherever the land is unsuitable for agricultural purposes.' The commission urges the reforestation of tracts which have been stripped of timber, not only when located at the head-waters of navigable streams, but wherever this would be the most valuable use of the land.

Professor J. W. Toumey, Director of the Yale Forest School, gives an example of a careful comparison of the stream-flow of a forested area, and of a non-forested area in the San Bernardino mountains. 'The forested area (under scientific forest management) during December had a run-off of five per cent of the heavy precipitation of that month, and during January, February and March of the following year had a run-off of thirty per cent of the rainfall. This stream experienced a well sustained stream-flow after the close of the rainy season.

The denuded area had a run-off of forty per cent of the precipitation during December and had a run-off of ninety per cent of the rainfall during the three following months. The run-off in April (per square mile) was less than one-third of that of the forested catchment area, and in June the flow had ceased altogether in this basin.'

Professor G. F. Swain, of the Massachusetts Institute of Technology, says that the effect on the streams of wholesale destruction of forests is well known. 'It is certain enough that they are subject to more sudden fluctuations and are less sustained in droughts than before the country was cleared. These results are matters of common observation among men whose memories reach back over fifty, forty or even twenty years. It is a universal complaint in New England that the mill streams are less reliable than they were that length of time ago, and this is due both to the wholesale clearing of land and the drainage of swamps.'

Observations made by German forest officials show that of 100 mm. (4 inches) of water falling on forested territory, 10.5 per cent evaporates, 20 per cent is arrested by the crowns of the trees, 25 per cent is absorbed by the forest floor, and 44.5 per cent soaks into the upper layers of the soil. On the other hand, when the same quantity falls on bare ground, 68.5 per cent evaporates and runs off, and 31.5 per cent is held in the soil.

Referring to our western conditions, we find that the economic development of the waters of the west, for purposes of irrigation has scarcely begun. This means that the waters of the eastern slope of the Rockies and the interior valleys of British Columbia must be most carefully watched. The policy of the federal government in placing the eastern slope of the Rockies in a forest reserve came none too soon. These forests include some 11,456,000 acres of mountain and hillside. The catchment basins for the Bow, Belly and Saskatchewan rivers, and many other streams nearly as important, are located in this region. Unfortunately, present methods of lumbering in this region invite destructive fires which, once started in such mountainous districts, will surely sweep to the mountain tops, destroy the forest cover on the

inaccessible slopes, where it would never be reached by the lumbermen, but where the forest cover is, nevertheless, of the utmost importance in controlling the stream-flow. A campaign of education should be started to show the lumbermen where it is to their great advantage to remove the starting place of most forest fires, namely, the slashings.

In directing the future work of exploitation the most stringent regulations regarding the cutting of timber should be enforced. In addition to this, if we are to maintain an efficient and satisfactory fire patrol, a clearcut policy and vigorous administration, absolutely free from political control, must be established. A forest service which will not support its field men in the carrying out of its regulations will soon lose the respect of the people whose confidence and sympathy it wishes to gain.

In this connection, I note with satisfaction that the Province of British Columbia has inaugurated a comprehensive scheme of forest protection and management, with a board of directors and experts in every department. Already this board is securing the co-operation and support of the people of the province, so the ultimate success of its forest policy is practically assured. However, British Columbia must move with great care. Only ten per cent of her available fruit lands are under cultivation, and it is fundamentally necessary that every care should be taken to perpetuate, regulate and control the flow of water in all the streams within her borders.

Lest we repeat the history of eastern countries, we should heed well the laws of nature and strive to secure the enactment and enforcement of corrective legislation. Measures must be taken to safeguard the water-using interests of the west and to retain control of all lands necessary for catchment areas. Steps should also be taken to secure the reforestation of denuded areas, both for the sake of the timber crop and for the regulation of stream-flow.

In conclusion, the practice of forestry on the extensive watershed regions of the west will do much to safeguard the interests of the irrigation areas, and at the same time secure forest products of the greatest possible value to the future inhabitants of the country. (Applause.)

### THURSDAY, AUGUST 15.

The morning was devoted to an excursion through the district surrounding Kelowna, details of which are fully set forth in the interim programme included in this report.

### THURSDAY AFTERNOON SESSION.

CHAIRMAN.—The first item on this afternoon's programme is a paper by Professor C. I. Lewis, of the State Agricultural College of Oregon.

#### SOME PHASES OF IRRIGATION IN RELATION TO FRUIT-GROWING.

By PROF. C. I. LEWIS.

MR. CHAIRMAN, LADIES AND GENTLEMEN.—In considering the relation of fruit-growing to irrigation, two pictures immediately come to my mind, and they illustrate pretty nearly the present status of irrigation and fruit-growing. In the first case, I

see a lot of soft spongy apples of poor quality, watery peaches and insipid cherries—fruit which neither keeps or ships well. I see the orchard dying; the seepage pools creeping among the trees and the alkali doing its deadly work. Winter injury is also taking its toll, and various diseases are playing havoc among the trees. If this is the consequence of correct irrigation, then irrigation as related to fruit-growing is surely a curse, and, while this picture too often is true, it should be the great exception and not the rule.

The other picture that I see is, orchards in the finest of vigour, producing maximum yields of fruit, which they bear annually—fruit much improved in quality, being more juicy and palatable. The fruit is found to be of a larger size, of a brighter or more lively colour. We find that more intercropping is practiced among the trees successfully, there are less windfalls and culls usually, and, if this is a true picture, irrigation becomes one of the greatest blessings of the country.

In travelling quite extensively over the Pacific coast, I have seen these pictures repeated over and over. One man says it is impossible to grow fruit with irrigation, another man says it cannot be grown without irrigation. The truth is that irrigation should not have a different effect on the fruit than natural rainfall.

A great advantage in irrigation lies in the absolute moisture control of the soil. The trouble with irrigation lies, namely, in the fact that we are constantly blaming the science of irrigation when we should blame the ignorant irrigator. We have not made irrigation the science it should be. We have been more interested in how much water to use rather than how little. We have not emphasized sufficiently the importance of drainage in connection with irrigation and the relation of tillage to irrigation. We, also, need to practice a more intelligent interplanting of our fruits. It is a very common practice to see all classes of fruit grown on the same piece of soil under irrigation, and while they can be grown and marketed at a profit, it is very rare that they can all be grown to the highest degree of perfection. Take peaches, for example: it is very unwise to irrigate peaches up to within three weeks of harvesting; on the other hand, if this rule were followed closely, the apple trees planted among the peaches might suffer. Undoubtedly we are tempted at times to grow too large a specimen and too much fruit per tree at the expense of quality.

Up to the present time we have spent most of our energies on the engineering phases of the irrigation problem, and this was necessary, as these projects had to be started and the water distributed. Having received the water, we simply poured it on and expected nature would do the rest. Our expectations have generally been fulfilled, although nature does not always pay us in the way we anticipate.

The Division of Horticulture of the Oregon Agricultural College and Experiment Station has been working on irrigation problems for five years. This work has been carried on in southern Oregon fruit districts, in the home station at Corvallis, and in eastern Oregon at Hermiston, where we have a forty-acre irrigation experiment station.

As it relates to the bearing fruit trees, in our work we have made a study of the subject in a very broad way, but it will be a number of years before complete data can be secured. Taking irrigation water for example, we have studied date of application, amount applied, the kind of water to use, whether river, well or spring, temperature of water at its point of source and as it reaches the land, and the depth of percolation and spread by capillarity, and the drainage.



In considering the soil, we first made a study of its general composition, such as clay, gravel, free soils, pumice, and volcanic ash. This included a close study of the subsoil as well as the top soil, as very often the subsoil is more important than the top soil; also mechanical conditions and whether or not the soils are full of humus, or deficient in it. After applying the water we have been studying the soil very carefully, whether it has a tendency to puddle or pack, and whether its characteristic is that of cracking as it dries.

We have taken into consideration the relation of cultivation to irrigation, and have compared tilled soils with those that are both tilled and irrigated. The temperature of the soil, including the subsoil, before and after irrigating has been investigated and the rapidity with which water travels through the furrow and percolates through the soil.

As concerns the fruit, we have noted whether there are any changes in colour; whether the size was influenced; what were the percentages of large, medium and small apples secured from different amounts of water. Studies of the firmness, shipping quality and keeping quality, total yields, the form of the fruits, its time of maturity and a chemical study have all been made.

We have already studied very carefully the chemical composition of the apple as influenced by irrigation over a period of two seasons. This needs to be carried over a series of years in order to give conclusive results which can be published. We have studied the tree itself, concerning bud and wood growth, the effect of wood growth and the effect on the tree in a general way; the relation of irrigation to the terminal buds according to their size, whether large or small, firm or soft; whether the percentage of fruit buds was increased by irrigation; what was the average growth and length and diameter of the annual growth; at what date the wood ripened; whether it was affected by frosts or winter injury; whether the foliage was vigorous; how its colour was influenced; at what time did it colour in the fall, and what was the date of the dropping of the foliage.

We studied the tissue and cell structures of the fruit, leaf and wood. Of course, we must take into consideration the age and vigour of the trees, and the way they have been cultivated and pruned.

In the short time at our disposal to-day we cannot go into all these phases and can only touch on a few of them.

The Division of Horticulture of the Oregon Agricultural College has issued Bulletin 113, on Orchard Irrigation Studies in the Rogue River Valley. Unfortunately we do not have enough of these bulletins to be able to send them broadcast for general distribution. However, the bulletin is to be published by some of our leading horticultural magazines, and those interested will undoubtedly have an opportunity to secure the paper which contains the bulletin.

In a period of five years we have found it impossible to carry on all these lines of investigation, neither have we found it possible to complete certain lines that we have started on. We are continuing this work from year to year, and hope the future will give us more information which relates to the true duty of water in fruit production.

It must, of course, be understood from the start that irrigation of an orchard means that each individual grower must study his problem carefully himself, and,

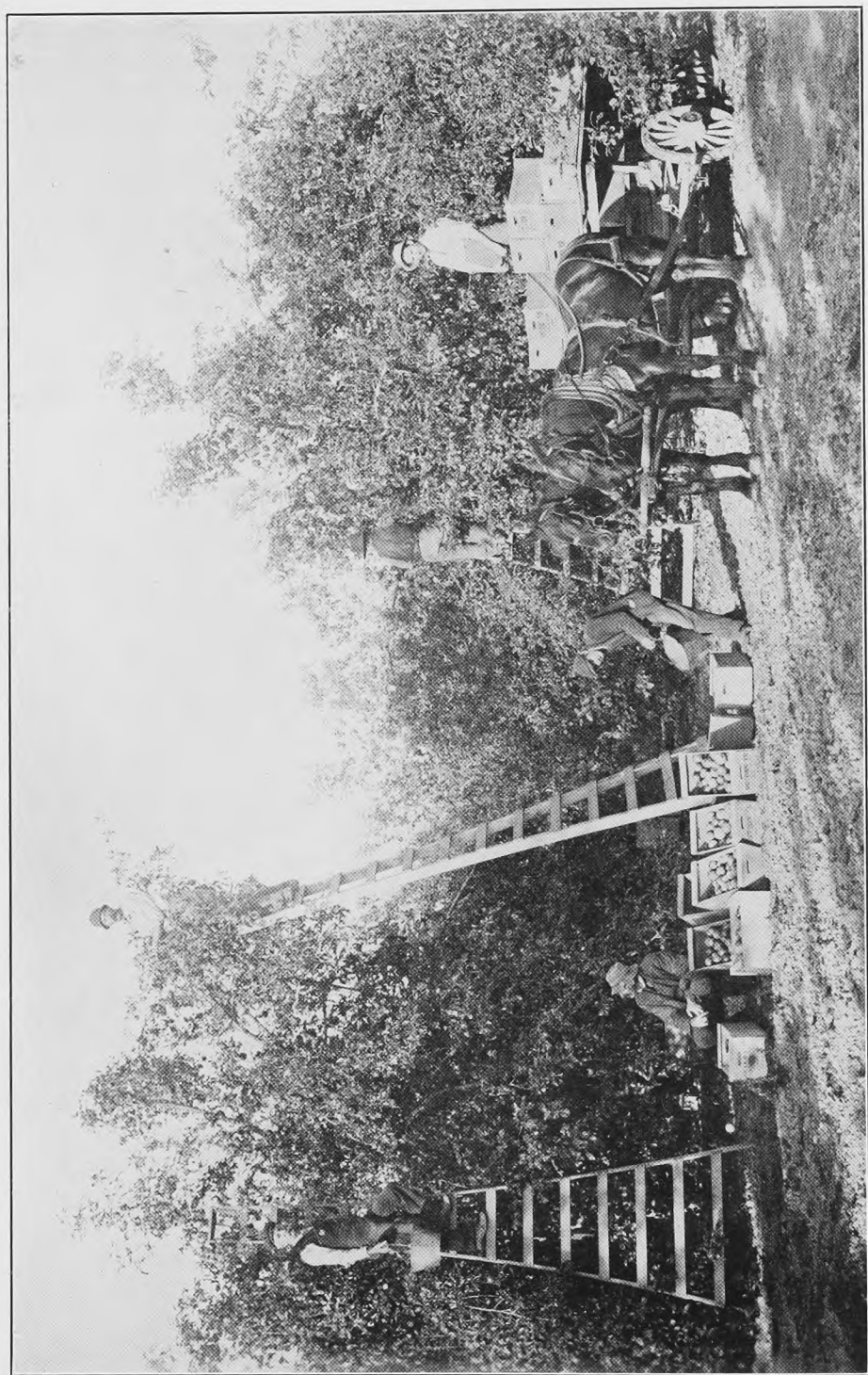
while he will be able to get a great deal of information from the experience of others, he will have to work out the special application under his own peculiar conditions. The age of his trees, the variety, the type of his soil, the average climatic conditions, will all influence his problem. If, however, we can get the grower interested in studying his problem carefully, and realizing the importance of such a study, we have won a great victory, especially so if we can teach him that he should work on the basis of how little water is necessary rather than how much, and that irrigation cannot successfully be made to take the place of tillage. The irrigator must be led to learn that he is certainly his brother's keeper. If his neighbour suffers because of his unwise irrigation, he sooner or later will suffer himself.

In our work we have found that irrigation aided in giving us a larger percentage of fruit that came up to good packing size. This meant that there was a smaller percentage of culls on the irrigated than on the non-irrigated plots. Closely associated with this problem, I also wish to add that we were able to reduce the percentage of windfalls. The saving at times amounted to as high as fifteen per cent of the crop.

When the fruit trees are heavily loaded in the fall, the strain, of course, on the tree is very heavy. If the tree does not receive the amount of moisture that is necessary to mature the crop it immediately begins to shed its fruit heavily, and this loss at times becomes extremely heavy, the fruit beginning to drop a few weeks before picking time and continuing up to harvesting. In one experiment which we conducted on a dark alluvial loam with Yellow Newton trees nineteen years of age, the first plot was given 600 gallons of water per tree in two applications about the middle of July and the middle of August; the second plot, 1,500 gallons per tree the last of July and the latter part of August. The difference in favour of the greater irrigation was five per cent less culls and fifteen per cent less windfalls. Had the owner been willing to have an additional irrigation given in September we could have reduced quite materially the percentage of windfalls, but the trees were so heavily loaded with fruit that he feared that with irrigating we would knock off many of the apples.

We have noted that the shape of the fruit can be materially changed by irrigation. The additional moisture gained has a tendency to cause the fruit to be more angular and elongated. For several seasons this has been noted. Not only have I noticed this on the irrigated as compared with the non-irrigated orchards, but I have seen it illustrated on the plots that were very well tilled as compared with those that were in sod or received poor tillage. In an experiment that we have been running at our home station at Corvallis with Yellow Newtowns, those that were in sod when compared with the well tilled fruit have given this difference. Yellow Newtowns on the well tilled plot mature later, are more elongated and brighter in colour. Those that received poor care and were allowed to stand in the grass matured earlier and had a deeper yellow at harvesting. This same tendency we found illustrated in the young as compared with the old trees, elongation and angularity of the fruit being an indication of vigour.

Considerable influence has been noted as relates to colour. This is especially true on some of the lighter soils and where red apples were grown. Each year the irrigated apples have had a brighter, more attractive and handsome colour, so to



Picking Jonathan Apples, Mr. Pridham's Orchard, Kelowna, B.C.

speak, while those on the dry checks were duller, yet deeper in colour. Of course, the trade wants the bright, live, attractive apple. In a number of cases it was found that irrigation had an influence on the succeeding crop. The irrigated trees have more numerous and stronger fruit-buds. This difference can often be noted at the blooming time. This was especially noticeable this last spring. The trees that had received more care and had sufficient moisture bloomed more heavily than those which had not had as much moisture. Undoubtedly under proper conditions irrigation will have an influence in making the trees regular bearers.

Under conditions which are equal we find that irrigation has a tendency to produce more wood growth. We have noted that this is true even though the trees are more heavily loaded with fruit. More wood growth is obtained from irrigation where the trees have not been vigorously winter-pruned and are getting ample moisture. The difference between the dry check and a moderate amount of water is greater than between a moderate amount and an excessive amount. In one experiment the increase in terminal wood-growth of the irrigated over the lighter or non-irrigated amounted to twelve inches as an average.

I have already spoken in regard to the less culls on the irrigated as compared with the non-irrigated, or those which are suffering from moisture, but the percentage of culls first mentioned had to do with the small size. We found, however, that there were less culls on the well irrigated tracts, due to less calyx cracking, and you doubtless know many of our varieties like Jonathan suffer greatly from calyx cracking. Cracking may occur not only at the calyx but at the stem also. In most cases it is due to the fact that the fruit hangs on the trees too long. In our work we found the fruit on the dry checks matured earlier than that on the irrigated plots. It showed that irrigation had a tendency to cause the apples to mature somewhat later, which meant that the irrigated fruit was in somewhat better condition at picking time, and we, therefore, had less of the cracking. Probably had the dry checks been picked earlier, less cracking would have been noted, but on the contrary it is sometimes almost impossible to pick the fruit so as to avoid the cracking.

Irrigation tends to keep the leaves green later in the fall, and it also has a tendency to cause the leaves to hang much longer on the trees than otherwise. In fact, if moisture is given to the trees in the form of rainfall or irrigation so as to keep them in activity, we can expect the results noted. There is some danger in certain seasons with young trees from over-irrigating. This would have a tendency not to harden the trees. I have noted that the trees are sometimes more than a month later in maturing when heavily irrigated than otherwise.

I may cite a couple of experiments as regards the foliage colouring on the plots: Plot I received 600 gallons of water per tree the middle of July and again in the middle of August; Plot II, 1,500 gallons per tree were given July 20 and August 25. On October 4, the foliage of the trees on Plot I began to colour on many of the trees and dropped; Plot II was still of good dark green colour, and by November most of the trees on Plot I had shed a large percentage of their foliage; while a few had done likewise on Plot II, the greater number had not. On most of the trees the foliage was just beginning to turn. It was noted in these plots that the trees which had a light crop tended to colour earlier and drop their foliage earlier than those heavily loaded with fruit. With the second experiment, Plot I received 1,200 gallons



of water per tree August 14; Plot II received 865 gallons per tree July 27; Plot III received 555 gallons per tree July 27; Plot IV was a dry check. On the dry check the leaves began to fall and colour by September 20, followed by Plots II and III, the foliage of these plots maturing about the same time. On Plot I, receiving the heaviest irrigation, the foliage remained green later and had not fallen late in November.

One advantage which we have noted in the favour of irrigation was that of its relation to the growing of cover-crops. We found that on the irrigated plots not only did the natural weeds grow but also the cover-crops made a much better growth than on the dry checks. This will be a very important factor in those orchards which are suffering because of a lack of organic matter and humus. Irrigation will aid very materially in building up the humus content of such soils.

We have found that the irrigation practices in one district will vary, and that such differences can be attributed to the kind of soil, variety of fruit, and age of trees. Such problems as the exact time and the best methods of irrigation will vary according as the first-mentioned conditions vary.

We find a great variety of soils on the Pacific slope. The problem of irrigating some of these becomes somewhat complicated. In some sections we have very heavy types, such as the stickles or adobes, and our experiments show we generally get better results under cultivation without the use of irrigation water on such soils. They are very difficult to irrigate, and, if irrigated, the water should be warm. There is a possibility that the best way to handle such soils would be to grow crops and use the water for both tree and shade crops. On the lighter types of soil more water is needed, especially where apples are grown. On the pumice soils or the very fine type of volcanic ash, we found in southern Oregon that at least 3,500 gallons of water per tree is necessary, distributing this water in about three equal irrigations, June, July and August. We obtained the best results by allowing a very small stream to flow down the furrow, increasing the amount up to four inches per furrow as soon as the soil began to take up the water. In some of the free soils in the Rogue River valley we found that where they were properly cultivated they responded best with irrigation to the amount of from 2,400 to 3,000 gallons per tree, dividing the water into two irrigations. This kind of soil is low in organic matter and takes water very slowly, and to get an even distribution through the soil it is necessary to have a large number of furrows with a small amount of water in each.

From some experiments which we have conducted with ten-year-old Newtowns on river-bottom soils, which vary from medium to slightly heavy texture, splendid results were obtained from applying 1,600 to 2,000 gallons per tree, divided equally into two irrigations, one in July, the other in August. This type of soil takes up water freely and a comparatively large head per furrow may be used.

On some of the lighter granitic soils it is better to use a number of furrows between each tree and use a small head of water. In nearly all cases furrows and rills are used, flooding having been practically abandoned in the northwest. In a few cases, however, where the soil takes up water very slowly, if a sort of check or basin system is used it will prove to be one of the best systems.

From experiments that we have conducted with Bartlett pear trees seven to ten years of age, that were in good vigour, we found that the application of irrigation



water seemed to have a tendency to make the trees more susceptible to disease, such trees having a tendency to blight more. Under conditions where pears were not making normal growth, it would be better to add water regardless of the age.

The use of excessively cold water on pears is a very questionable practice. Many of these heavy soils crack, and the cold water rushes down the cracks and interferes with the root functions. From some observations we have made we are led to believe that the practice is detrimental rather than beneficial.

In experiments we have conducted with Winter Nelis, d'Anjou and Bartlett pear trees eighteen years of age, located on a rather heavy type of soil, the orchard was divided into several plots; the poorer soil was given heavier irrigation, while the better soils were given intensive cultivation, but no irrigation. The results favoured non-irrigation, showing that irrigation cannot be made to make up for poor quality of soil.

Under all cases cultivation is a most important feature to be considered in connection with irrigation. With thorough cultivation given the ground in early spring and the maintenance of a good soil mulch during the growing season, the soil will be in a better condition to receive the water, and a more economical use of water is allowed. Irrigation should merely supplement good tillage, and the importance of thorough tillage during the growing season cannot be overestimated.

Good drainage, either natural or artificial, is necessary where large amounts of irrigation waters are used. Where drainage is poor, seepage waters and alkali often destroy many of the orchards. Often the excess irrigation does not injure the man who practices it, but his neighbours who may be at a lower level.

The temperature of the water we found to be a subject which needs more attention. With well water we found there is a tendency for the water to be fairly constant throughout the season. However, the water can be made to increase its temperature quite materially with various methods of distribution. For example, in our test we found that the temperature of the water increased  $8\frac{1}{2}$  degrees in flowing in open furrows from the well to the point of distribution, and that it was still further increased in passing through the distribution rills in the orchard. There was also a much greater increase in the afternoon than we experienced in the forenoon.

When the water was used from a large irrigation ditch during the months of July and August, the water was found to be of the same temperature as the soil early in the morning, but the temperature of the water was greatly increased in the afternoon. In some cases it was increased  $15\frac{1}{2}$  degrees over the morning temperature. This would mean that where the soil tended to be a little heavy or where the water tended to run a little too cold, injury could result from irrigation.

In some cases where the temperature of the water was higher than that of the soil there was a slight decrease in the temperature of the soil when it flowed through the furrows, especially if these furrows were located in the shade of the trees. In all cases when temperatures were read it was found that the soil had decreased in temperature immediately following irrigation. This decrease was more noticeable in the surface soil than in those at a greater depth. In some cases there was as much as three degrees difference in temperature in the first foot, and this gradually decreased at four feet in depth, while in some cases the soil temperatures remained the same at a depth of three feet and below.

From the investigations we have been able to make we can easily determine that irrigation is a subject having many phases and one which is going to require our closest and most careful study if we are to bring trees to their highest degree of productiveness. (Applause.)

CHAIRMAN.—The paper is open for discussion for a few minutes, if any delegates care to discuss it.

Mr. McLEAY (Kelowna).—Might I ask the professor the age of the trees which took thirty-five hundred gallons?

Professor LEWIS.—Some fifteen to eighteen years of age. The Winesap is an apple pretty small unless it is pushed on. These were on a pumice stone soil, off which the water runs very quickly—a very fine, powdery soil. We found it necessary during the season to use thirty-five hundred gallons, divided into three irrigations. We have found men putting on four thousand gallons per tree. That sounds big, but that is because you do not measure your water. If you measured your water, you would be surprised at the amount used. We cut down this man to nine hundred gallons with better results.

Mr. R. R. BURROWS.—Is there any experience in planting apple trees on pine land, with a light, sandy soil?

Professor LEWIS.—We have a good deal of that soil in Oregon. Your success with such soil depends first on how carefully it is prepared. If it is thoroughly cleared, fall-ploughed and worked down well, you can plant the following spring successfully, but I would advise you to grow vegetables for a few years first. Apples like the Jonathan do especially well on that kind of soil, but it should be disced well and irrigated a number of times, if possible, before planting the trees, so that the ground settles. A great deal of that ground is full of resin from the pine bark, and the soil must be built up.

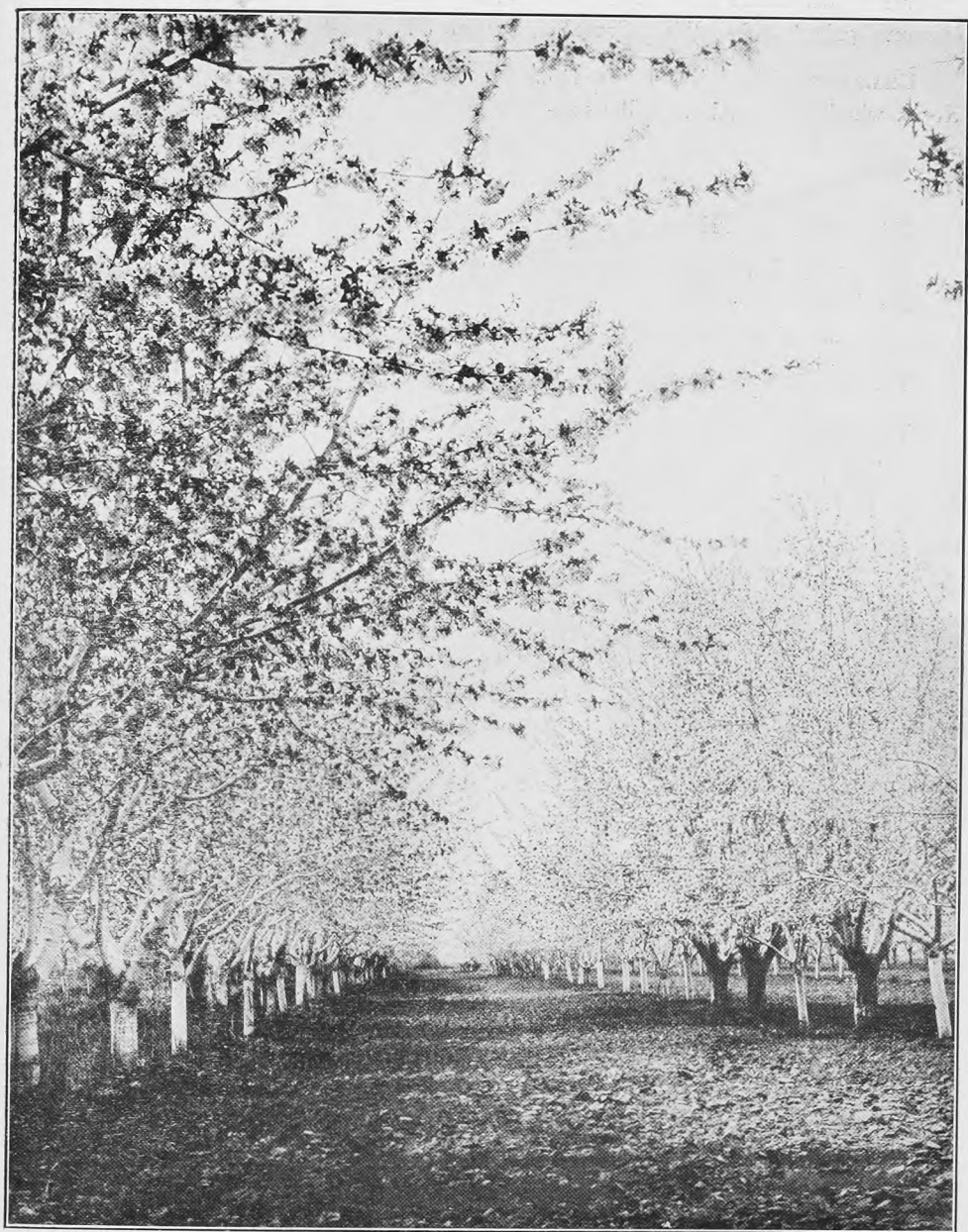
Mr. STOBART.—Is it better to plant onions or anything between or keep the land perfectly clear and do nothing but cultivate?

Professor LEWIS.—I would say it depends entirely on your soil. If the soil is deep and extremely rich, the young trees, planted thirty feet apart, do not take up all the plant food available. Under such conditions, intercropping does not injure the trees, but be very careful what you grow. Do not grow grains. An average crop of potatoes takes out about ninety pounds of potash per acre. It becomes a matter of personal study. The trees may be growing too rank, and I would not hesitate even to put grain on under such conditions and thus reduce the sappy, vigorous growth of the root.

Mr. E. FOLEY-BENNETT.—I would ask if it is possible to obtain copies of your most valuable paper?

CHAIRMAN.—It is the intention to include all papers in the printed report and all the members will receive copies.

Professor LEWIS.—We got out five thousand copies of a bulletin dealing with orchard irrigation studies in the Rogue River valley and they were in great demand,



An Avenue of Cherry Blossoms in Mr. Pridham's Orchard, Kelowna, B.C.

but I will try to do this, if the secretary will give me the names and addresses of all delegates to this convention, I will try very hard to secure and send copies of that bulletin to all delegates. (Applause.) The title of the bulletin is as follows: Orchard Irrigation Studies in the Rogue River Valley, issued by the Experiment Station of Oregon Agricultural College, Corvallis, Oregon.

CHAIRMAN.—There is a report from the Committee on Resolutions on Resolution No. 6, which now reads as follows:—

RESOLUTION No. 6.

Moved by J. L. Pridham, seconded by H. W. Raymer:

Resolved, that the government be asked to insert in the Water Clauses Act the following:—

That the government will make an annual inspection of all irrigation works.

You have heard the resolution. Carried.

The following resolution, No. 13, is reported by the Committee on Resolutions:

RESOLUTION No. 13.

Moved by J. L. Pridham, seconded by Charles Wilson:

That the government be asked to hold exhaustive inquiries in every district and, if necessary, in California, and fully ascertain the position as regards irrigation matters, and their present condition of affairs, with a view of enacting legislation for the proper distribution of water.

You have heard the resolution. Carried.

CHAIRMAN.—The following resolution has been reported by the Committee on Resolutions:—

Moved by Thomas Bulman, seconded by O. J. Wegen:

Whereas the successful settlement of the Dry Belt of British Columbia is dependent upon an ample and permanent water-supply for irrigation purposes and on the efficient and economical distribution of water to all land capable of irrigation that can be supplied without undue expense; and,

Whereas the present system of supplying water by joint stock companies in many districts serves only limited areas, and a large amount of first-class fruit and farm land is thus without a permanent or satisfactory water-supply; and,

Whereas in the opinion of this convention it is desirable and will assist in the developing of the country and safeguarding of the interests of the farmers and fruit-growers that might be supplied with water from a common source, that they have the power to organize for the acquiring of existing systems and water privileges generally;

Therefore be it resolved, that it is desirable that a scheme be formulated giving the inhabitants of districts served from common sources of water-supply the power to take over, control and operate for the benefit of all land in such

districts, all water records, irrigation companies and associations organized for purposes of supplying water, and that the provincial government be respectfully invited to prepare and present to the legislature of the Province of British Columbia at its next session a bill providing for the establishment of water districts and for the organization of the inhabitants (being users of water) into corporate bodies, defining their powers, duties and obligations.

Mr. MACKELVIE.—Mr. Chairman, I would like to move an amendment as follows, to be added at the end of that resolution:—

And that the government of the province be respectfully invited to consider the question of aiding water districts in the investigation preliminary to the establishment of a water district and, under proper control, granting assistance by guaranteeing the bonds of such a district or in such other manner as may be deemed most expedient.

Mr. BULMAN.—With the consent of Mr. MacKervie and my seconder, I would like very much to have that amendment added to my resolution; it makes it complete. I don't know whether that means it returns to the Committee on Resolutions or not, but it is important to ninety per cent of the delegates at this meeting and ought to go to the convention now and be concluded.

Mr. MACKELVIE.—I am quite agreeable, Mr. Bulman.

Mr. WEGEN.—The farmer is asking for nothing but what belongs to him and is his.

Mr. SCOTT (Blackwood).—I think the thanks of all the fruit-growers, that is, the lot holders, are due to Mr. MacKervie for having taken up our cause here. We hear a great deal about the vested interests of the companies. The lot holder has an idea that he pays two to three hundred dollars an acre for his lands and spends one and two or three thousand dollars on it for a house and improvements, and three or four years of his life in bringing the orchard into bearing, and that he, too, has vested interests which he is willing the government should look after, as well as those of the companies. (Applause.)

Mr. MACKELVIE.—I would like to know whether, if this resolution and amendment are passed, they will go down to the government without any editing on the part of the Committee on Resolutions?

CHAIRMAN.—The matter is now before this convention. Whatever resolutions this convention pass will go to the government. You have my assurance in that respect. (Applause.) Is there any further discussion? You have heard the resolution and amendment. Who is the seconder to Mr. MacKervie's amendment?

Mr. J. T. SPEER.—I second that.

CHAIRMAN.—Are you ready for the question? The resolution and amendment are carried.

I now have pleasure in introducing Mr. William Pearce, who will read a paper on 'Irrigation and Forestry as Practiced in Foreign Countries.'



Mr. PEARCE.—Mr. Chairman, ladies and gentlemen: The title of my paper as printed is not quite correct. My title was merely,—

SOME COMMENTS ON IRRIGATION AND FORESTRY AS THE RESULT OF CURSORY OBSERVATIONS MADE ON A TRIP THROUGH THE FOLLOWING COUNTRIES: EGYPT, SUDAN, INDIA, CEYLON, BURMA, JAVA, AUSTRALIA, TASMANIA, NEW ZEALAND, PHILIPPINES, FORMOSA, CHINA, KOREA AND JAPAN.

Forestry and irrigation are in many countries most intimately combined. In some cases it is impossible to combine the two owing to natural features, but where they can be it is invariably good policy to do so. This point will be treated at further length in alluding to the conditions in Japan. The want of combination is particularly marked in China and in Korea. In the Sudan, forestry plays a part probably to a slight extent in the water-supply of the Blue Nile, which comes from the mountains of Abyssinia, but the great storage for the White Nile is caused by swamps and the sud therein.

EGYPT.

The portion of Egypt that is inhabited and irrigated above Cairo, along the Nile, is a very narrow strip, does not average on the whole probably ten miles in width, excepting an area to the northwest of Cairo which was originally an old lake area, but in which basin irrigation has rendered fertile a very considerable area. North of Cairo the Nile splits into two channels, which in turn are, by nature or artificial means, divided into a number of channels. The celebrated Barrage at Cairo was erected for such distribution. The area under irrigation in the delta of the Nile is a triangular portion, being approximately an equilateral triangle 100 miles on each side. For some distance back from the Mediterranean coast the problem that is forcing itself most strongly on the attention of the public is the necessity of drainage owing to the deposition of salts on the land. These salts, it is stated, did not come down in the Nile water, but were deposited in the soil from the sea when it was a portion of the Mediterranean. That problem is a most difficult one, and is engaging the attention of some of the ablest minds, and the solution will be of the greatest interest not only to the irrigation world but also to the world in general. That that solution will come there is no doubt. The interests at stake are so large that if there is a solution possible it will be accomplished.

The irrigation of Egypt is largely inundation, the waters of the Nile being held up by the celebrated dam at Assuan which is being raised some fourteen metres, the surface of the water to be raised thirteen metres, which will provide perennial irrigation for the whole of Egypt below the dam. This paper will not allude in detail to this gigantic structure, as probably most of this audience are familiar therewith. In any event the details can be readily obtained. It might be noted in passing that the raising of this dam is going to destroy many ruins, and the Archæological Society has been protesting against it, but commercial interests have overcome sentiment, laudable though it may be generally. The ruins of Phile are the chief ones which will be flooded totally except when the waters of the dam are drawn off. When once flooded they will, of course, be covered to a sufficient extent by silt to at least

mar, if not wholly destroy, their beauty. One of the most surprising things is that there is so little silt deposited in this reservoir. It is probable that the silt in the Nile is so very fine that it is held in suspension and does not settle so long as there is any movement at all in the water and the discharge and intake keeps up a movement, though perhaps slight. It may be that further up, a considerable distance above the dam, there may be considerable silt, but the engineers think not. No detailed accurate measurements have yet been made on this point. The explanation is probably this: The Blue Nile, which carries silt, largely comes down in May and June, and nearly all, if not all, passes direct to the land. The storage is all from the White Nile, which brings down very little silt. It comes down late in July, August and part of September, and is stored for use till the Blue Nile waters come down the following May. The mode of discharge when the reservoir is low, also, may have a strong tendency to gather up the silt and carry it out of the reservoir.

Another popular idea which is incorrect is the statement that the silt of the Nile is very fertilizing. That is disputed by men whose opinions are worthy of belief, and one of the hard problems now awaiting solution in Egypt is the lack of fertilization. The debris around the old Arab towns and old ruins is now being packed out to the land on camels' and donkeys' backs and used for fertilizer. The habits of the Arab have tended to make this contain a very considerable amount of fertilizer. To illustrate the amount of debris accumulated, it may be stated that in some of the large ruins at Luxor this had to be cleaned out to the depth of twenty-five or thirty feet before the floors were reached.

The great bulk of irrigation in Egypt is by inundation or flooding, the diversions being caused by barrages across the river, of which there are three, viz., one at Cairo, one at Assyut, and one between Luxor and Assuan. In passing it may be stated that the barrage at Cairo was erected by the Egyptians. The Khedive who was ruling at the time of its erection, although he engaged the services of an eminent French engineer to plan the barrage, conceived the idea that he knew more about engineering than the Frenchman did, and constructed against the protests of the engineer. The result has been that it has to be watched and nursed very carefully, and any day it may be that a disaster may overtake it which would be fatal, for a good portion of one year at least, to all of Egypt below, so far as crop is concerned. In the season of 1910 the bottom of the regulating weir of the canal which supplies the water to a large portion of Egypt dropped in one night thirty-six feet, and allowed as much of the River Nile as could go through the canal to go down. The services of Sir John Aird and Son were secured, who were given *carte blanche* to repair the damages, and they did it all within six weeks. First, they put a temporary dam across and then erected the permanent one. In this case a very wide base of concrete was made resting on the bed of the stream, and it is thought now that it will stand all right. The two barrages on the Nile above Cairo are supported wholly on a very soft bottom by a very wide base of concrete, and in discussing the matter with Mr. McDonald, engineer in charge of the public works in Egypt, he said he considered that was the only mode feasible for the construction of works where the conditions were similar to those on the Nile. At Assuan, however, the great dam is built upon the hardest kind of granite the whole distance across the river, and built of the same material quarried on the east bank of the river.

To give some idea of costs in Egypt, it might be stated that at Assuan the best of sand for mixing with Portland cement to make the joints on the apron of the dam was being packed in from the desert, a distance of eight miles, and delivered at a cost equivalent to seven cents per cubic yard.

Assuan is supposed to be the hottest part in Egypt, and as the result they have turned into an alfalfa field what was the original yards for dressing stone and workmen's houses, immediately at the lower side of the dam, an area of probably 100 acres. This, it is stated, is highly fertilized, but a fair crop of alfalfa is cut every eleven days through the entire year. By a fair crop is meant it is not allowed to grow large and coarse, but is cut when about ten to twelve inches in height, and is most suitable for fodder for the donkeys, horses, cows and goats, &c.

In addition to the flooding, however, when the river is low, very considerable irrigation is indulged in along the banks of the river and also along the banks of the canal by lifting by hand-power with bucket or Persian wheel; when by hand-power the exertion is used only in pulling down the empty bucket. Each lift is eight or ten feet and in some places you will see four lifts one above the other, so as to get the required height on the bank.

As the Nile lowers, the bars and slopes on the banks of the river are planted out with crops. After the recession of the Nile, crops are put in on those slopes and bars which, however, must mature before the next high water. A number of tomato plants were being put in at Luxor in January on one of these bars, and it was stated that in six weeks the crop would be taken off. A good deal of wheat is grown, but the areas referred to are largely devoted to vegetables, potatoes, lettuce and such foods.

The tributaries of the Nile in Sudan are very high in flood and go practically dry at other portions of the year. Thus Atbara river, judging by the bridge and other evidences of flood, would carry down at times probably 60,000 second-feet of water, and in January, 1911, it was dry, not a drop of water being in sight.

Along the line of railway between Atbara and Sudan, which skirts the Nile, one is struck by the provision made for storm run-off. While the rainfall usually is very light, at times it is torrential, and there being a gradual slope the area drained is very large and the run-off fairly rapid, so that when the water reaches the roadbed very great provision is made for its discharge across same.

#### SUDAN.

A very interesting question there regarding the rights of Egypt to the waters of the Nile is now prominently in the foreground. Egypt, by reason of its usage in the past and the non-usage to any considerable extent by Sudan, claims the absolute ownership of the waters of the Nile. The conditions since the Sudan has come under British rule are such that it is highly advisable that very considerable irrigation should be carried out; in fact at present there is considerable, but only in small tracts in the bends of the streams, the water being readily taken out of the Nile owing to the cataracts which occur above Wadi Halfa and below Khartum, the mouth of the Blue Nile. The total area thus irrigated, however, is a very small percentage of the whole, and is not at all fitted to support the population which it is anticipated

the Sudan will carry in the near future. Owing to the troubles there which were ultimately suppressed by General Kitchener, the population of the Sudan decreased from 8,500,000 to 1,900,000. The 1,900,000 left, however, were largely female, and, as polygamy is not only allowed but encouraged, the increase in population will be very rapid, and immigration from the south will, if sustained, rapidly build up a very large population in Sudan. One notices there a great mixture of races. You will see the genuine Negro from some distance south forming quite a percentage of the population.

There is a tract of country along the Blue Nile extending up 150 to 200 miles from its junction with the White Nile, having an average breadth of 70 miles, which can all be irrigated from the Blue Nile, that is, if the Egyptian interests will permit the utilization of the water for such. Those advocating that scheme state that by cutting the sud through, the White Nile will bring down as much water in addition to what now comes down as would be taken out of the Blue Nile, thereby Egypt would not be deprived of its supply of water. Of course, there is still another point which this would not meet, viz., that the Blue Nile comes out earlier than the White Nile, but, as the Sudan is wholly under British control and Egypt largely so, it will probably be that the problem will be solved somewhat on the lines mentioned.

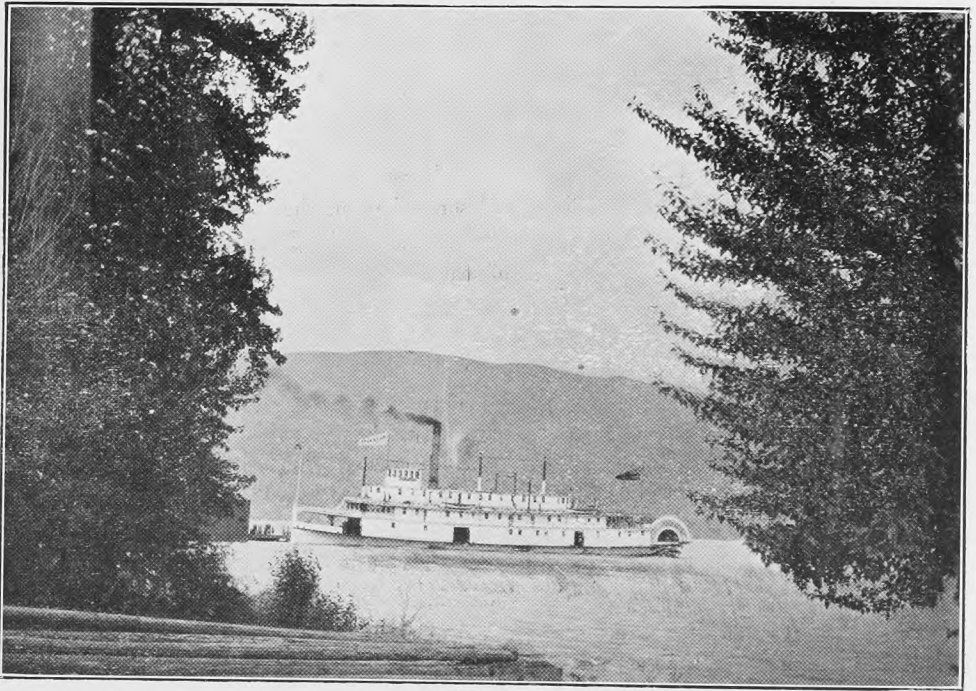
It may be mentioned that when a point on the White Nile is reached about 200 miles above Omdurman, the junction of the White Nile and the Blue Nile, an immense area of swamp covering very many thousands of square miles is met with. This is covered with vegetable growth which acts as a sponge, is many feet in thickness, strong enough to carry camels across, and extends across the river proper. This swamp acts as a storage for the Nile and holds up the water, and a vast amount is evaporated and never goes down the stream. If there were channels cut through, these channels would take down a very considerable portion which is now absorbed into this sud and evaporated. It is thought not possible to drain this swamp itself, but by cutting through it one would tap the waters in the lakes which are absorbed by this swamp, and by that means the White Nile would be brought down considerably earlier in the year than the high water naturally occurs.

It may be of interest to note that the dredging and sud-cutting machinery now being built and soon to be operated on the Nile, has been designed by a Canadian engineer formerly of Montreal, largely on the lines of the dredges used at that port. The machinery is being built in England from his designs, and this gentleman, named Stewart, has charge of these operations.

It might be here mentioned that in Egypt, the Sudan, considerable portions of India, and China, a very considerable amount of irrigation is accomplished by means of raising the water by the Persian wheel with its chain of pottery buckets, and it is claimed by many that, up to a lift of thirty feet, there is no more economical means of raising water. In India in some parts water is raised for irrigation purposes by bullocks drawing up water in a skin bag by a rope drawn over a pulley, and after it is brought to the top, the oxen have to return over their course while the bucket is being lowered—a most awkward and tedious system. It will also be noticed that, so far as the utilization of man-power is concerned, the appliances are all that can be desired or expected in the way of accomplishment with the least energy, but when it comes to the utilization of other power, usually oxen, cows, donkeys, the appliances

are far from being all that they should. A little more attention paid to them would accomplish at least sixty per cent more than is now being done. However, it is presumed that bullock labour is proportionately as cheap as man labour, and when it is considered that in Egypt, India and in many parts of China a man can be engaged, and furnish his own board, at from five to seven cents (our money) per day, they can afford to be somewhat prodigal of labour.

While on this subject and connected with the use of water, it might be mentioned that one will see, in the countries mentioned, streets watered by means of the goat-skin water bags, by dippers using the water out of buckets, and also by buckets something like our garden watering pots, and when one stops and calculates the cost of



The SS. *Okanagan* at Dock, Summerland.

Photo by Rankin.

the labour and sees the results he will probably find that the streets are watered at less cost per unit than is done by us even with those large water tanks on our street railways.

#### INDIA.

The great proportion of gravity irrigation in India is carried on by means of the Ganges and Chenab canals. By what has heretofore been known as the Upper Chenab canal, 2,500,000 acres were irrigated from one intake intended to carry about 8,000 or 9,000 second-feet but which was, in February, 1911, stated to be carrying nearly 11,000. To realize the benefits of this scheme one has but to reflect that this land was originally an absolute jungle or desert, and only during the rainy



season, about six weeks of the year, was any use made of it, and that by a class of nomad Mahomedans who came down from the Himalayan foothills with their cattle and grazed on it. After irrigation it was divided into plots of 1,100 feet square, containing about 28 acres each (to be precise, 27.77 acres), 25 of which is supposed to be cultivated, the balance to be occupied by the buildings, ditches, pathways, &c., of the owner or lessee. This plot of 1,100 feet square is divided into twenty-five plots, each supposed to contain an acre, each plot being levelled and surrounded by a small bank; first one plot is flooded and then another. The water superintendent can at a glance, in going over the property, tell how much water is being used. They have in India (and in any other irrigated country it is presumed) trouble between the user and the supplier, i.e., in this case, the government. Stealing water is a common practice in that country, but the law is strictly enforced, so that one would anticipate that the problem would soon adjust itself, but owing to the peculiar character of the native of India, who is naturally fond of a 'row' in the way of litigation and excels any other man on the face of the earth for perjury in the courts, such is not so. There is very considerable trouble going on, although the districts so affected are fairly limited as to area and numbers, and it is only by the strictest enforcement of the regulations that such a condition is able to be reasonably met and overcome.

The Upper Chenab canal, which is expected to be completed next year, will carry 14,000 second-feet, and will place under water 3,500,000 acres of land and produce results quite as good as has been produced by the Middle Chenab. It should be stated here that in this scheme every fourth plot is reserved as public pasturage for the use of the settlers on the remainder. A certain amount of stock has to be kept for the ploughing and cultivation, and for taking produce to market, &c.

Where the Middle Chenab scheme has been carried into effect, there are two railways running across it, said to be the most profitable railways in India. Towns are built up along it at intervals, as, for instance, Lyalpur, so named after Lyal, at one time a prominent official of the Punjab. The same condition will no doubt occur in the new scheme.

The Chenab river, from which this water is taken, has a very wonderful variation in discharge. It has had a record of 860,000 second-feet, and as low a record as 6,500. In other words, the flood was one hundred and thirty times as great as the minimum. These canals out of the Chenab require more water than the Chenab furnishes, and another river has been diverted into the Chenab. Both of them are tributaries of the Indus.

To show what has been done, it might be mentioned that, during the season of 1910, 69,000,000 bushels of wheat were shipped to Mediterranean ports from Kirachi, the chief (if not the only) port on the Indus. There is a big scheme now being worked out to irrigate a large portion of Scind, also from Indus water, but below the mouth of the Chenab. There is any amount of water, and, if it can be demonstrated that the scheme is financially possible, there will be no trouble about getting the money to construct it. Heretofore all the irrigation outlay in India has netted a revenue of rather more than seven per cent, in many cases as high as eleven per cent, therefore, once it can be shown that a scheme will be at all revenue-bearing there is no trouble in obtaining the money required to carry it into effect. India is now

supplying very considerable capital for this and other enterprises. The amount of wealth hoarded in India and not interest-producing, if rapidly put on the market, would cause huge financial disaster.

The Upper Ganges canal was the first large irrigation canal, and it is still a world-wonder. The man who designed it, an Irish major in the Engineers, should have had a monument erected to him long ere this, and one is rather astonished in going through India, a land of monuments and statues, not to come across a monument to commemorate him and his work. The only record seen was a bust painting of him which was hanging on the wall of the headquarters office at the intake of the canal at Hardwar. It cannot be attempted in this paper to go into details of this canal, but I will merely state that the work he did has rendered possible very many undertakings on the same lines since, and this man in designing it had nothing to go by in the way of example. He must have worked it out wholly on his own initiative. It might be mentioned that there are viaducts on it in many places, and in one case at least four miles in length and from ten to fifty feet above the ground. This canal is carried under rivers, over rivers, across rivers on the same level, and across a country that is one of the worst in the world for earthquake shocks, and while these structures are nearly wholly of brick double-walls, filled in with tamped clay, all have stood the test of more than half a century.

In southern India a very considerable area is irrigated directly from streams and also from storage (that is the dams on the streams hold up the water till it is required to be used), but throughout the whole of India probably twenty per cent of the irrigation is accomplished by means of raising water by hand or animal power, and the remainder by inundation or gravity.

In the major part of India at least two crops per year are raised—in northern, or the elevated, portions during the winter season, grain, chiefly wheat, and forage; in the summer, maize, cotton, sugar-cane, &c., and rice. The duty of water per second-foot in the Punjab is, in the summer, 40 acres, in the winter, when the water is scarce, about 140 acres. In many parts of India two crops of rice are obtained per year, but in the northern portion only one. To the west of Madras, at an elevation of about from 3,000 to 4,000 feet above sea-level, a very considerable area is now being devoted to the cultivation of fruits, largely grapes and the more delicate fruits, and the writer was informed by one of the Chaffeys, who were some years ago so prominently connected with the fruit schemes in Australia, that at the request of those interested he visited, about two years ago, the district in question to give them the benefit of his experience; and he stated that he was strongly tempted to go there and engage in the enterprise himself. He said he believed it would be a great success financially.

#### CEYLON.

The great crop at present in Ceylon is tea. That is not irrigated. There is considerable rubber being planted now at lower elevations. It is claimed by many that rubber will not be profitable at a greater elevation than 2,500 feet, at some places 2,000 feet. That elevation would probably take in about fifteen per cent of the area of Ceylon. Tea is grown at low elevations, but it also is grown successfully at an elevation of 7,000 feet. The climate of Ceylon is the same year round. Tea is

picked every day in the year. In Darjeeling, in northern India, at the foot of the Himalayas, tea is grown at as great an elevation, but only picked for about nine months of the year. The tea is not injured by the cold, but its growth is not sufficient to warrant its being picked. It is stated that the higher the tea is grown the better the quality is, although the quantity is greater on the lower elevations. That from the lower elevations requires a mixture of that from the higher to bring grade up to the standard.

The irrigated portions of Ceylon are devoted largely to rice, and the water-supply is largely from storage. The same conditions exist in Java. In Java, however, a good deal of sugar and tobacco is grown, and that is irrigated also. The rice paddies are terraced. A very great amount of labour has been expended in such terracing, and one would infer that the Singhalese were much more energetic people in the past than they are at present. It is probable, however, that at the time this terracing was done the men who did it were slaves, and did it under rulers, for the history of the country would indicate that the rulers of Ceylon had been most tyrannical.

In Ceylon there have been at one time large reservoirs held up by earth dams. The process of building dams in a tropical country where labour is cheap, the material being brought in in baskets carried on the head, aids greatly in the solidification. Probably there is no earthwork laid in which will last better than that constructed in this manner. These dams were used for water-storage supply for rice paddies. These, together with the ruins of ancient temples, would indicate that at some time prior to the taking possession of this country by the Dutch, civilization and arts had attained a very much higher grade than existed at the time the Dutch invaded this island. The term 'invaded' is used because practically they never conquered it. That was left to the English when they took possession of the island at the beginning of the nineteenth century, but it was not till about the middle of it that the Singhalese were thoroughly in hand. The Dutch rule in many of the tropics has been largely a failure owing to the commercial spirit prevailing. In other words, as the trading element predominated, they considered it more advantageous to buy the natives off when they made a raid than to give them a thorough thrashing. The result was they had to continue the process of buying. The same thing exists in nearly all the Dutch islands except Java, which, owing to the character of the native combined with the immense number of them, viz., thirty millions, enabled the Dutch to handle the problem of colonization very easily.

Burma produces probably seventy-five per cent of the rice that goes into the export trade of the world. In the past it has been grown nearly altogether by the Burmese, but a very interesting evolution is taking place in that country. The male portion of the natives of Burma is perhaps the most indolent in Asia, while at the same time they have very considerable civilization. The Burmese objects to working, and, although he can readily grow two crops of rice in the year, he contents himself with only one and makes the female portion of the community do the work. The result is that, as he is thus a 'poor provider,' the Burmese girl prefers for a husband a Chinaman. The Chinamen are drifting down from the north, and are a rather high grade of Chinaman, and in the not distant future the pure Burmese population of Burma will be a very small proportion of the whole. The same condition exists to

probably even a greater extent in the Malay Peninsula. At such points as Singapore and Penang the Chinese have been in control for nearly two centuries, and have evolved a very high grade of character and physique. Rangoon in Burma also has at least forty per cent of its business controlled by Chinese, the balance being controlled by Europeans, chiefly English. The male native of Burma does not figure as a business man to any considerable extent.

The lower part of Burma does not require irrigation, in fact it requires drainage. From meteorological reports there is no doubt that the part of Assam in India and the portion of Burma bordering thereon have the greatest rainfall of any part of the world. The houses have all to be built up some distance from the ground, but that condition exists all along the sea coast. In fact, in some of the islands the villages are over the water altogether on piles or posts well above high tide. There are two conditions which cause that, the one sanitation, the other defense from their warlike neighbours.

When one proceeds a few miles from Rangoon en route to Mandalay he goes through immense areas of rice with villages constructed of split bamboo. When a fire starts in a village the whole of it goes. Irrigation is practiced a good deal, however, the water being taken out of streams which are tributary to the Irawadi. There is no difficulty in getting the water out of these streams, as the bed of such streams is usually higher than the surrounding country. The problem is to prevent the banks breaking and flooding the country. Burma presents very many openings for European capital and also enterprise, that is the direction of labour. In the southern part of Burma as well as the Malay Peninsula at present very considerable attention and capital is being devoted to the cultivation of rubber, and it would seem probable that the world's supply of rubber could be obtained from the said district, provided, however, of course, that the expectations of the rubber men are fulfilled even to the extent of twenty-five per cent of their calculations or claims. Coal, iron and other valuable minerals in large quantities probably exist.

#### JAVA.

In addition to the rice irrigation, which is done chiefly from storage or small streams, there is extensive irrigation from rivers and large streams for tobacco and sugar. The erosion in the mountains where the streams rise is very considerable, hence they bring down a good deal of silt in the shape of gravel, usually fine. It builds up the bottom of the stream. A portion of that bottom is taken to make embankments to keep the stream from going over the land, so that now in many cases the bottom of the stream-bed is several feet higher than the land which is irrigated therefrom, and the bank is four or five feet still higher. The banks are artificial. You will thus see that the problem of taking the water out is an easy one. The only thing is to control it.

If the Javanese continue to be as adverse to leaving Java in the future as they have in the past, and increase at the rate they have—having increased from seven millions to upwards of thirty millions in the last one hundred years—sugar and tobacco cultivation must become a thing of the past in that island, as the arable land will all be required for the growth of rice to support the home population. Even at

present a certain amount of rice is imported from Burma into Java, used for food for the natives.

#### AUSTRALASIA.

Irrigation is practiced to some extent in Queensland, but chiefly in the way of providing stock watering. It has a considerable territory of artesian wells, some of them very large in volume, but these are used altogether for stock-watering purposes and the growing of timber along the water-courses fed by these bores. 'Bore' is the term applied to an artesian well in that country. The water carries too large a quantity of salts to enable water from these bores to be advantageously used in agricultural production. If Australia had some high mountains across it to collect snow and water precipitation it would be one of the grandest countries in the world, but, as it is, it is subject to droughts, and the rivers generally lie so low that whatever irrigation is done can be done usually only by pumping, and it is only fruit crops as yet that would stand the expense attendant on that system of irrigation.

In New South Wales, however, there is a large storage proposition now under construction known as the 'Burrinjuck.' Ultimately that can be extended so as to irrigate about 250,000 acres, and Mr. Elwood Mead, who is well known in this continent in connection with irrigation and who is now Irrigation Commissioner in the State of Victoria in Australia, advised the writer that he had examined and reported on this proposition, and says that he is certain it will prove a very valuable and remunerative one, and its possibilities may be very much greater than is at present anticipated. In other words, it may be that in fruit culture not the amount of water at present estimated will be required. This irrigation scheme is to be devoted largely to the production of fruit, and the conditions are reported as most favourable for that.

The State of Victoria has considerable irrigation down in the Golbourne, by storage and the water placed on by gravity. Considering the size of the state, however, the percentage is very small, but similar schemes can probably be worked out to a greater or less extent on other rivers and creeks; at best, however, it will prove expensive, and only a very small percentage of the country can be so irrigated.

The Murray river, which is the boundary between Victoria, New South Wales, and South Australia, for several hundred miles carries very considerable water, as does also the Darling, its tributary, when in flood. The Darling in dry seasons goes dry and in wet seasons it is steamboated for over 1,000 miles from its mouth.

What irrigation is done from the Murray is by pumping, and as yet is confined to two districts, viz., Madura, which is in Victoria, and Renwick, which is in South Australia. These are fruit areas, the crops consisting of plums, peaches, grapes, currants, &c., which are dried and packed. The refuse is used to make alcohol, which in turn is used to reinforce the native wines of Australia. The wine-producing areas are scattered, the districts mentioned produce little or no wine, but the alcohol is taken to where the wine is made.

Adelaide has a very fine sewage farm, which is really irrigation; the irrigation, however, is produced by pumping from the city. So far as one could judge, the results were very good in the way of forage.



In Tasmania and New Zealand the rainfall is considerable, and there is not much irrigation practiced, although in many places there are considerable areas which could be successfully irrigated, if necessary, and which, no doubt, in the future will be. The only obstacle is that the streams when they are in flood carry down a vast amount of gravel which renders the problem of irrigation a somewhat difficult one. If reservoirs are created to check this gravel they soon fill up. You will find, particularly in the neighbourhood of Christchurch, across the valleys of some of these streams that a width of sometimes a mile on each bank has been so covered with gravel that it is useful for no other purpose than pasturage, and not first-class for that. Much of the soil, however, is very high grade.

NEW GUINEA.

This, the next country which was visited, has not yet had settlement enough to enable irrigation to be practiced, and along the sea coast where the settlement is, irrigation is not required generally, although in some places even there it would be beneficial. No doubt in time considerable irrigation will be indulged in.

The next point is the

PHILIPPINE ISLANDS.

In these islands a very heavy monsoon—the greatest ever recorded—which occurred just before the visit of the writer, prevented his seeing as much of the islands, particularly the island of Luzon, as he desired. What railways there were were knocked out of commission, the water in some places was up as high as the arms of the telegraph poles, the roads impassable, bridges all swept out. To give an idea of the storm, the rainfall at Bagnio, the summer capital of the island of Luzon, according to meteorological reports was as follows:—

On July 14, 1911.. . . . .	34.64 inches.
July 15, 1911.. . . . .	28.88 “
July 16, 1911.. . . . .	16.73 ”
July 17, 1911.. . . . .	7.89 “
<hr/>	
Total for the four days.. . . . .	88.14 “

and from July 14 to August 13, inclusive 125 inches of rain fell. An automobile road of some thirty miles in length connecting Bagnio with the nearest available railway points, on which \$5,000,000 (Mex.) had been expended, was wiped out of existence. This roadway followed the bank of a gulch throughout its entire length, the heavy rainfall caused a slide in the bank above Bagnio and dammed up the water to a height of over 120 feet, when the dam broke; the water coming down cleaned everything before it. These data were obtained from the Meteorological Office at Manila and no doubt are authentic.

FORMOSA.

The unusually heavy monsoons which occurred on the island of Formosa in August and September curtailed greatly the area desired to be visited. The portion of the island devoted to sugar could not be reached. All the railway bridges across

the larger streams were washed out, and in one case an entire railway train with its crew was lost. It was stated it would take at least four months to have railway transportation reinstated. At Taipei the water rose till it was three feet deep on the streets, causing the collapse of upward of three hundred houses (adobe) and the death of twenty-nine people, crushed by the collapse. The electric lighting, water-supply and sewerage were totally put out of operation. Evidences of rice irrigation were manifest between Tamsui and Taipei, were in some places visible, but generally covered by water. A great deal of the crop was ruined, some wholly, all partially.

#### CHINA.

The irrigated portions of China visited by the writer were the neighbourhood of Canton, the triangular area which for the purposes of this article is described as having Hanchow, Shanghai and Nankin its angles, also portions along the Yangtze (the latter was flooded, all the crops destroyed, many thousands drowned and millions more or less suffering starvation), and some small areas between Hankow and Peking and in the neighbourhood of the railway line between Peking and Tientsin.

All of this is irrigated by lifting the water, usually not more than three to five feet. A great deal of the country along the railway line between Shanghai and Hanchow, also Shanghai and Nanking, was, owing to the extraordinary high water of the Yangtze, flooded, and the rice in many cases was wholly under water. In some cases where the tops stood out of the water a few inches it was being harvested by men wading to their waists in mud and water, in other cases in boats, much like a large washtub. Some were striving to dry the straw and grain on the footpaths or on bamboo scaffolding, and in some cases were beating out the grain by striking the heads over the sharpened edge of boards, and drying the grain on the roofs of houses and on mats spread out on dry knolls and ridges. The vegetables were, in a very considerable area, totally destroyed. The only things that seemed to be enjoying the condition were the ducks, which are reared in immense numbers and herded by boys, in flocks of probably about 500 in each. One of the chief articles of export from Nanking is dry salted ducks, and millions of them are said to be shipped yearly from this point. One can see them in the Chinese markets in this country. Eggs and poultry are produced in many parts of China, and the former can be bought for from three to five cents per dozen of our money. One large German firm near Hankow purchases millions; they are dessicated (I am not certain that is the correct term), then canned and shipped to Europe and used in pastry and confectionery.

In irrigation, the water is lifted by Persian wheels and tread-mills propelled by men, women and children. These tread-mills vary from one to ten man-power, which mills work an Archimedean screw or a spiral revolving in a case.

A map of the triangular area alluded to is most interesting, showing probably ten per cent of the area consisting of canals, ditches, lagoons, &c., from which the water is procured. The Grand canal crosses this tract, and there is a very considerable amount of water carriage carried on by junks and other water craft. It strikes one from this country as peculiar to see the whole landscape dotted with sails, no matter what direction his line of vision may take, when at the same time he can see practically nothing but vegetables in sight. If water carriage is an ideal one, then certainly the people of this district have attained the consummation in that respect.

## KOREA.

Korea, like Japan, is a very mountainous country. Probably not more than twenty per cent of either is arable. The mountains are reported to be rich in minerals, particularly free milling gold. The hills and mountains were once rich in timber, no doubt, but have been stripped, and the erosion is frightful. Since the Japanese assumed control of this country the indiscriminate cutting of timber has been stopped, and reforestation attempted, but it means a hard proposition to successfully solve. There being a sparse population and one that subsisted wholly on rice, the absolute necessity of forest protection was not emphasized as it should have been till the damage was done, and was, in many cases, irremediable. The Koreans are not good agriculturists and provided no drainage to their rice paddies, though such in many cases was cheaply attainable, so that in a very wet season like that of 1911 most of the rice paddies were covered with water six to fifteen inches in depth when the grain should have been harvested. If first-class rice, hard and flinty, is desired, it is necessary to have the ground thoroughly dry to enable the grain to mature as it should. Possibly the Koreans and Japanese do not object to a damp, soft grain of rice. It is possible, if not probable, that under the intelligent guidance of the Japanese the agriculture and general conditions of Korea will very greatly improve. The press reports of the Koreans' strong objection to Japanese control would appear to be greatly exaggerated. Irrigation in Korea is rather crude. It has in the past consisted merely of diverting the water out of the streams as it comes down from the hills and before it reaches the low lands, and running it out on the flats, which are used almost wholly for rice growing. As already stated, no attention is paid to drainage. These flats could no doubt be readily drained, but probably in the majority of years the land does not require it, but it certainly did in the season of 1911, as the wet conditions not only very greatly injured the rice crop in quantity but also in quality.

Transportation in Korea is done practically altogether by oxen, packing, and certainly the animals they utilize seem to be particularly well fitted for that labour. Probably it is evolution which has brought them up to the present grade.

It would seem probable that in the near future a very great deal of foreign capital will be utilized in Korea in the way of mining development, particularly in gold, and to some extent in iron and coal. Since the Japanese took possession of and administered Korea, a fairly liberal set of regulations have been adopted regarding mining. The regulations have been copied wholly, without any change whatever, from the mining regulations adopted by the British administration in India, so far as the precious metals are concerned. That would seem to be a very considerable tribute to the English administration and might be worth looking into.

So far as came within the observation of the writer, no irrigation by storage was seen in Korea. It does not follow, however, that there may not have been at some points very considerable storage indulged in.

## JAPAN.

In the island of Kiushiu so far as visited, very considerable irrigation is practiced but largely by storage, and that is terraced and the lands utilized for the growth

chiefly of rice, and to some extent of vegetables. The rice crop was being harvested, but the writer was informed that when it was taken off a forage and grain crop would be put in, the grain being chiefly wheat which would be utilized for food, but judging by the statistics of the country no very considerable amount of wheat is grown. Probably the winter crop is devoted largely to forage. In the island of Hondo, however, a very considerable amount of irrigation, particularly in the vicinity of Kobe, is carried on by gravity, and the erosion there is something wonderful, particularly when the size of the streams in their normal condition is considered. When the railway crosses one of those streams, say within five miles of where it debouches from the mountain it is crossed by a tunnel under the bed of the stream, and that without lowering the grade in the slightest. In other words, for some miles from where these streams leave the hills they have built up their beds from thirty to fifty feet above the general level of the plain, and on either bank of the stream itself an irrigation canal or ditch is carried along which has also been built up by erosion, and that process is continually going on, although it is probable that owing to forestation this erosion is not nearly so great as it was some years ago. When one arrives within a mile or two of the seashore, however, these streams spread out very shallow and broad, and have very low banks, necessitating very long and expensive bridges where the railway crosses them, as, for instance, in the neighbourhood of Osaka. This makes railway construction in Japan very expensive.

Throughout Japan, where water can be obtained, irrigation is practiced, though, as in every other country, there are considerable districts where water cannot be utilized.

This point might, however, be well emphasized that in many countries where the rainfall is so great that to most of us it would seem improbable that irrigation could be successfully practiced, yet invariably such is done. In other words, a crop is found which will take with profit an immense amount of water. Rice is one of those crops. It is stated that where water is plentiful as many as eleven feet per annum can be profitably utilized in the cultivation of two crops of rice.

#### FORESTRY.

In opening this paper the question of forestry as being so closely linked with irrigation was alluded to, and this is particularly emphasized in Japan. The Japanese receive a very great amount of praise, and rightly so, for the intelligence, perseverance and success attendant on their forestry operations, but when one comes to investigate he finds that with the Japanese, as with most other people who have made great strides in any particular line, such advance has been forced on them. In other words, if the Japanese had not devoted very considerable attention, intelligence and energy to the growth of trees, at least fifty per cent of the present population of Japan would have had to leave the island, as they could not have made an existence—that is, the erosion from the hills would have destroyed at least fifty per cent of the cultivable area of Japan, and when one considers that, at best, not more than twenty per cent of the islands is cultivable, he must be strongly impressed with the value, in fact the absolute necessity, of forestry. This forestry was started on a very considerable scale probably not more than 100 or 120 years ago—at least one would judge that was the case from the size of the trees—but on that point no very reliable data was

obtained by the writer. In fact the chief object of forestry in that country has not been for the growth of timber but for the prevention of erosion. In other words, the trees selected are largely of a scrubby, non-deciduous type, that will grow closely together, branch out from the ground, and have a great growth of roots, thereby protecting the soil as soon and as thoroughly as possible from erosion.

In connection with this subject of erosion it is interesting to notice the attempts made to grow grass on the steep slopes. The Japanese will take and cut out sod about six inches square, put these on to a very steep bank which has an angle of at least forty-five degrees, and each sod is then held in place by a stake and the stakes are held in their relative positions by bamboo strips. The grass is cut at a season when it will take root easily, and the whole mountain side is watered frequently by hand so that the grass may take root. This is particularly noticeable in the large cuts along the railway lines and also on the large embankments. One sees that forestry has been practiced throughout the cultivable portions of Japan. In going up to Nikko one travels for miles by the railway in sight of an avenue of trees having a length of upwards of forty miles, some of them four feet in diameter. This avenue was planted some two hundred years ago by the then ruling dynasty, the Shoguns, Nikko being the pleasure, religious, and, to some considerable extent, political resort for the ruling members of this dynasty, and this avenue was the roadway on which they were carried when going to or returning from this point. It might be mentioned that Nikko is still one of the places where visitors are encouraged to go on account of its scenery and climate. During one of the revolutions, however, which occurred in Japan some fifty or sixty years ago, the populace was so incensed at the ruling dynasty that they cut down and pillaged this avenue at very many points. The trees were, of course, valuable on account of the timber in them; they were cedar, and grew, many of them, two to four feet in diameter, and carried their dimensions well up the stem.

When one contrasts the conditions in Japan with those existing in Korea, he cannot but be struck with the idea that the Japanese are certainly much more intelligent than the Koreans, particularly in the matter of forestry, and then when he contrasts Japan with China he is still more forcibly struck with the apparent lack of intelligence of the Chinese in this regard, but a closer investigation will probably lead him to the conclusion that the intelligence of the Japanese in the matter of forestry was forced on them. Korea, having a sparse population, did not realize the necessity of forestation till the damage was done. In fact, the deforestation is still going on, and the only forestry that has been done is under the Japanese direction and compulsion, as they look to the time when they will place a large Japanese population in that country, and they wish to have it fitted to support these people. It will be most interesting to watch the development in China in that respect. The reforestation of Korea is a very difficult proposition, much more so than that of Japan, as it is more of a sterile soil, heavy clay in many places, and, as it is further from the sea, its rainfall is not nearly so large. In China, however, the problem of forestation is probably the greatest that presents itself to that country to-day. The destruction of the timber no doubt had occurred at a time when the population along the foothills and the streams, which took their source in the mountains where the timber was destroyed, was sparse; in fact in very large portions of China to-day the



population is sparse, and there is room now in Manchuria alone for probably fifty million Chinese if they could be persuaded to go there. The result of the destruction of the forests in China is most lamentable, particularly the flooding which occurred from the Yang-tse and Yellow rivers. The Yang-tse has, it is claimed, the second largest discharge of any river in the world, being next to the Amazon, but of that, however, the writer is far from being positive. However, that it has an immense discharge is undoubted, because one finds the water in the ocean discoloured, and highly discoloured, by the silt for at least one hundred miles from its mouth, and also the shallows of the sea caused by the settlement of the silt in the water. In other words, a vessel cannot approach the mouth of the Yang-tse river at night if she is drawing, say, upwards of twenty feet of water, with safety; in fact it is not attempted. The writer came in on a ship that was drawing about 26 feet of water, and that ship anchored at least sixty miles from the mouth of the Yang-tse about four or five o'clock in the afternoon during the month of September because the captain was not able to reach his anchorage at the mouth of the Yang-tse before dark, and the vessel when she did anchor had not more than five feet of water under her keel, and in coming up the following morning the mud was stirred up continuously. There are somewhat similar conditions at the mouth of the Irawadi in India. There the shore line is being extended rapidly south, and approaching the mouth of that river from either Calcutta or Colombo, one finds the propeller in a vessel not drawing twenty feet of water stirring up the mud probably when twenty or thirty miles from the nearest land. Owing to the deforestation in the mountains, these streams, viz., the Yang-tse and Yellow, with their tributaries, bring down such an immense amount of silt that they fill up the bottom of the streams, so that in time they readily overflow their banks and flood, as did the Yang-tse last year, millions of acres of land, drowning out the homes of the people, and bringing death or starvation to an immense multitude. One has but to reflect that the Yellow river in the past century changed its course, leaving its old bed some hundreds of miles from its mouth and making a new course for itself, changing from a course southeast to one northeast and discharging into the ocean several hundred miles from its former mouth. When streams are able to do that, one can realize the danger there is in such rivers from overflow of the banks. In fact the area which might be described as the delta area of the Yang-tse, which one goes over in travelling from Shanghai to Hanchow and from Shanghai to Nanking, is all delta land and has all been deposited from the Yang-tse river probably at one time to some extent by the Yellow. As one goes up the Yang-tse as far as Hankow he finds that the greater portion of the land in sight is water deposit from the present drainage system, the only exceptions being the high lands, not sixty per cent of what is in sight, which are rock and which were originally islands in the ocean. This will give him some idea of the erosion that has taken place.

At present a survey of the Yang-tse is being conducted under the direction of an American engineer, with a view of seeing what steps, if any, can be taken to prevent recurrent overflows and destruction caused by the floods of that river. It will certainly be very interesting to learn what the conclusions are, but it will take years of hard work and examination to arrive at sufficient definiteness as to what steps, if any, can be taken and what will be the cost thereof. The case, to one who has had

only a casual acquaintance or inspection of the country, seems a difficult one to successfully solve, but like many other things, investigation may demonstrate that it is not nearly as formidable as it would at first glance appear. There is no doubt, however, that things would be very greatly modified if a very extensive system of forestry was inaugurated and carried on to a successful conclusion, but it is a very large proposition and will take many years to successfully solve.

#### FORESTRY IN INDIA.

The British administration in India is doing a great deal in the way of forestation in that country. The route followed by the writer, however, did not bring him directly in contact with it, but from what was gathered a very great deal of intelligence and energy has been brought to bear not only on the reforestation, but particularly on lumbering operations, so as to carry on the same without reducing the reserve supply; in fact experience has shown that very considerable lumbering operations can be done, which will increase from year to year, by utilizing merely the mature timber or thinning out where the timber is growing too thickly. However, from the view of the Himalayas obtained and also from the information obtained regarding the discharge of the various streams, maximum and minimum discharge—that of the Chenab having been already alluded to—one would conclude that forestation does not play a very prominent part in those streams as far as equalizing the flow throughout a considerable portion of the year is concerned. Very many of the mountain sides are bare rock and not susceptible of forestation.

#### FORESTRY IN NEW ZEALAND.

A great deal of forestation is being carried on in this country. Prisoners are utilized for that purpose, and it is asserted that through forestry the utilization of prison labour is being solved not only to the advantage of the state but also to the prisoners. (Applause.)

CHAIRMAN.—Is there any discussion of Mr. Pearce's paper?

Professor Ross.—Mr. President, I am sure that every member of this association is under great obligations to Mr. Pearce for so valuable a paper. I knew, of course, there was something good coming, but I had not the faintest idea it would be so replete with information. This paper, to my mind, is the most valuable I have ever listened to on such a subject. In fact, I have just been thinking that some day I must try and get in touch with Mr. Pearce and try to secure some forty or fifty copies for my students in Toronto. It falls to my lot to teach forest protection, and I do not know of any one thing or single article that contains so much valuable information as this paper. One of the points brought out is that twenty per cent of Japan can be classed as agricultural land. Now it seems to me about the same percentage of land would apply to British Columbia. Possibly I am wrong. However, whether it is twenty or sixty per cent, the problem you have to face in this province is very similar to that of the Japanese, and I wish every member of this association to act as a missionary and to educate people, wherever he may come in contact with them, up to the necessity of handling this question of forest protection in your province.

You all have influence that will count for more than you think. Educate wherever the occasion presents itself, and try to get the people to hold up with both hands the policy inaugurated by the Minister. See that you don't get the province in the condition of older civilizations. This paper contains a splendid warning to you people in this young province. (Applause.)

Mr. WEGEN.—As I notice a few of the delegates are leaving, would it be in order to ask as to one of the resolutions in the interim programme?

CHAIRMAN.—Which one?

Mr. WEGEN.—Number four.

CHAIRMAN.—I am unable to answer the question at the moment. At the evening session I may be able to give you some return on that resolution. In the meantime the local secretary has an announcement to make.

The local secretary, Dr. Dickson, then announced to the convention particulars of the motor excursions to take place on Friday.

CHAIRMAN.—In answer to Mr. Wigen's inquiry, it has been reported by the Committee on Resolutions that that particular resolution did not come within the scope of this convention and therefore was not recommended to the convention.

I now have pleasure in introducing to you Mr. F. H. Peters, Commissioner of Irrigation of the Dominion Government at Calgary, who will read a paper on,—

## THE PROPER DUTY OF WATER AND THE NECESSARY IRRIGATING HEAD IN WESTERN CANADA.

By F. H. PETERS, Commissioner of Irrigation.

Mr. CHAIRMAN and gentlemen of the Sixth Annual Convention of the Western Canada Irrigation Association.—The paper which I am about to read is, as you have all seen from the programme, entitled 'The Proper Duty of Water and the Necessary Irrigating Head in Western Canada.' This is a subject of such great importance, and one about which so few definite facts have ever been published, that it is impossible to come to definite conclusions in the matter, and I have therefore confined myself to attempting to show the great importance of the matter, and also to suggesting along what lines the problem might best be worked out.

In using the term western Canada in this paper, I have meant the provinces of Alberta and Saskatchewan, and the remarks are not meant to apply at all to this Province of British Columbia, although it may well lay claim to being in western Canada. This, then, means that I am considering particularly the irrigation of grains, grasses, clovers and root crops, and these under such conditions as are found in the prairie provinces.

In my official position as Commissioner of Irrigation for the Dominion Government I am familiar with all the problems that are springing up to-day not only in the practical work of irrigating the land but also with the necessity of making such

régulations under the provisions of the Irrigation Act as will prove efficient and just in regulating the use of all surface water for the most beneficial use, and it is from this viewpoint that I pronounce the subject of this paper the most important problem that we have to study to-day.

And it is because of the utter lack of any investigations being made along these lines in our country that I have ventured to read this paper before you in the hope that it will bring the matter before this body and call forth such criticism and thought and action on your part as may be the means of starting some definite and comprehensive movement in the matter.

As I am a servant of the Dominion Government, it is not proper for me to offer it advice in a paper read before a body such as this, but I may say, and I am sure that you will agree with me, that as this is a matter that is for the good of the whole people of western Canada, it would seem proper that the Dominion Government should interest themselves urgently in the matter, particularly as it is their laws that regulate all matters pertaining to irrigation.

I do not wish to be understood as stating that the present duty of water as established (approximately two acre-feet per acre per year) is not a proper one, but I do wish to state most emphatically that no man can state definitely that it is a proper one, and therefore the inference is fair that it may not be a proper one; and, as I shall now take time to point out in a few words, the matter is so important as affecting our natural water resources that we cannot afford to risk being wrong in the matter a day longer than necessary.

Let me now point out to you with the examples of the simple cases how very important a matter it is and how far reaching and radical its effects are. And in the argument I take it for granted that you all admit the great commercial value of the water, and ask you to accept my statement that, on many of our rivers and streams, practically all of the available water has already been granted for irrigation purposes, which creates the critical condition when it is necessary to have the duty of water established just as near the correct value as possible.

First, let us suppose that the present duty of water is too high. That is, that it does not allow the irrigator sufficient water to gain the maximum production from his irrigated land. This, then, means that the holder of a water license, whoever he may be, has spent a large amount of money for the privilege of having the water, for which he expects to recoup himself by the increased production of the irrigated land, having figured, naturally enough, that the duty of water, as fixed by the government, was the proper one to allow him to gain the maximum added productiveness due to the economical application of water to the land. Then, when he comes to actually irrigate the land he will find that he has not got enough water to gain his proper added productiveness, and, therefore, his money and time have been invested in a false proposition. Is it fair or just that the farmers should be forced to take this risk when it must be remembered that the condition could never be rectified, because by the time such conditions are found to exist the whole of the flow of the stream will in most cases have been already apportioned out, leaving no extra water available?

Secondly, let us suppose that the present duty of water is too low, that is, that it allows the irrigator more water than he actually requires in order to gain, with

economical use, the maximum production from his irrigated land. This, then, means that every irrigator is granted more water than he actually requires and that the maximum potentiality of the stream or river to produce crops is, therefore, not being realized. In other words, for every two acre-feet of water, or thereabouts, that is being uneconomically used one acre of dry land near the stream is being robbed of the added productiveness that it would have with the application of water.

Again, gentlemen, I would point out that what I have meant by the term 'the proper' duty of water is more clearly stated as 'the most beneficial for all concerned' duty of water. In other words, considering the duty of water as being net delivered at the farmer's field head-gates, it should be such as will add the maximum productiveness with an economical use of water. And I would further point out that this proper duty would never be arrived at by the farmers themselves, because for each particular crop in each particular year they apply the same depth of water over the whole field, and, if they do get what is considered a good yield, this does not give any idea of how much better the yield might have been with perhaps the application of more water, or on the other hand, if he is a farmer who believes in putting on lots of water, it might be the case that if he had used only half as much water he would have got equally good results.

In order to determine the proper duty of water it is necessary to conduct experiments where the same crop under the same conditions will have different amounts of water applied to it so that it may be proved exactly what amount will give the maximum (or nearly the maximum) productiveness with the most economical use of water.

The point that I wish to bring out by this last paragraph is splendidly illustrated by the following table (Table No. 1), which is the result of an experiment made at the Gooding Experiment Station (about eighty miles southeast of Boise, Idaho) under a co-operative agreement between the State of Idaho and the United States Department of Agriculture and published in the report for the year 1909-10 of the State Engineer of Idaho:

In this experiment each of the plots was sowed at the rate of ninety pounds per acre on April 30; they were irrigated by flooding and all treated in exactly the same way, with the exception that different amounts of water were applied to each plot. Various depths of water were applied, ranging from zero to three feet, and a study of the table shows that the proper duty of water under the conditions existing was about one acre-foot per acre, because this was the amount that gave the maximum production with an economical use of water.





(1) *Climatic Conditions.*—The climatic conditions are, of course, the main elements in determining the duty of water, because they include the natural rainfall, the temperature, the humidity and the wind, which last element, in many localities on the prairie, has a far-reaching effect on the amount of water required. The two main elements are the rainfall and the temperature, together with their distribution over the growing season. In the following short table I have chosen five towns scattered over the two provinces in the localities where irrigation is generally practiced, and the figures show that the elements of precipitation and temperature are on the average not widely different.

TABLE 2.

AVERAGE PRECIPITATIONS AND TEMPERATURES.

Place.	Period.	Precipitation.		Temperature.	
		Year.	Irr. Season. <sup>1</sup>	Year.	Irr. Season. <sup>1</sup>
		Inches.	Inches.	Deg. F.	Deg. F.
Macleod, Alta.....	1895-1907....	12.92	8.51	41.18	57.50
Lethbridge, Alta.....	1902-1909....	16.81	13.64	42.40	58.50
Calgary, Alta.....	1885-1907....	16.28	11.86	36.86	54.50
Medicine Hat, Alta.....	1883-1909....	13.40	8.81	41.10	61.30
Swift Current, Sask.....	1883-1907....	15.70	10.60	37.30	58.40

<sup>1</sup> Irrigation season, May 1 to October 1.

(2) *Character of Soil and Subsoil.*—The character of the soil and subsoil to be irrigated has for any given locality the greatest effect upon the duty of water outside of the rainfall and temperature. It can be readily understood that with a very sandy soil much of the water will be unavoidably lost on the upper part of the field before it reaches the lower part, and even in the lower part of the field a great deal of the water will quickly penetrate so deep that it is beyond the reach of the ordinary plant root, while with an impervious soil very little water will be wasted on the upper part of the field and practically none of it will penetrate beyond the reach of the plant roots. The depth of the subsoil has also a marked effect upon the amount of water, and in some cases, if it be near the surface, the ground-water level is all-important.

Although the character of the soil will vary through every degree, I think that I can suggest to you now three classes that soils might be divided into, and each one for the same crop and under exactly similar conditions, requiring different quantities of water to give the maximum economical results.

The soil that will require the least amount of water is the deep soil that is moderately pervious to water, because in this soil very little of the water will penetrate so deep that it is lost to the plant roots, and yet it will go in deep enough so that the loss from evaporation will not be high.

The soil that will require the medium amount of water is the soil that is very impervious to water (heavy clay lands), because in this soil no water will penetrate

so deep that it is lost to the plant roots, but, on the other hand, it will stay so near the surface that the loss from evaporation will be abnormally high.

The soil that will require the greatest amount of water is the gravelly or sandy soil or a shallow soil underlaid with porous gravel, because in this soil (and subsoil) very little water will be lost by evaporation, but an abnormally large amount of water will be lost by penetrating so deep into the gravelly soil that it is lost to the plant roots.

The following table (No. 3), made up of figures taken from the report of the State Engineer of Idaho, 1909-10, shows very plainly the effect that the kind of soil has upon the proper duty of water:—

TABLE 3.  
SHOWING THE EFFECT OF THE CHARACTER OF THE SOIL ON THE PROPER DUTY OF WATER.

Location.	Altitude.	Crop.	Area.	Class of Soil.	No. of Irrigation Total depth applied.	Yield per acre.	Remarks.
	Ft. above sea-level.		Acres.		Feet.		
Gooding....	3500	Blue Stem Wheat.	0·084	Typical Lava Ash.	5 1·210	2000 lb.....	Sand soil.
" ....	3500	Sonora Wheat	0·089	" " "	5 1·100	1932 " ....	Proper duty.
" ....	3500	Little Club Wheat.	0·088	" " "	5 1·091	2102 " ....	Very constant.
" ....	3500	Blue Stem Wheat.	0·591	" " "	3 1·269	1539 " ....	"
Buhl.....	3900	Wheat.....	5·060	Deep uniform Lava Ash.	2 1·440	67 bushels..	Fertilizer used.
Rigby.....	4825	" .....	4·980	Very gravelly...	4 4·727	33 " ....	
" .....	4800	" .....	3·160	Gravelly clay...	4 3·100	36 " ....	
Gooding....	3500	Lincoln Oats..	0·962	Typical Lava Ash.	4 1·432	2047 lbs.....	
" .....	3572	Oats.....	1·980	" " "	4 2·486	2837 " ....	
Richfield..	4200	" .....	3·730	" " "	4 2·220	28 bushels..	
Idaho Falls.	4750	" .....	3·780	Very Gravelly..	4 4·140	1291 lb.....	
" .....	4740	" .....	3·660	Vol. Ash, clay sub soil.	3 1·710	2077 " ....	
Nampa.....	2500	" .....	3·560	Impervious Lava Ash.	3 1·220	34 bushels..	
Gooding....	3572	Alfalfa.....	3·560	Typical Lava Ash.	3 2·104	4·74 tons....	
Rigby ....	4825	" .....	2·510	Very gravelly...	7 9·401	5·20 tons....	
Idaho Falls.	4700	" .....	3·200	Volcanic Ash...	4 1·409	5·04 " ....	
Blackfoot..	4500	" .....	3·380	Sandy loam fine texture.	3 1·609	4·44 " ....	
Caldwell...	2450	" .....	2·810	Impervious Lava Ash.	8 1·895	4·00 " ....	Evap. very high.
Nampa. ....	2500	" .....	6·230	" " "	7 2·112	4·93 " ....	

NOTE.—The volcanic ash soil is practically the same as the soil that, in Alberta and Saskatchewan, is generally termed a fine clay loam.

Unfortunately, most of the experiments were made on soils of a fairly impervious character, but I feel convinced that the great difference shown on the soils of a gravelly nature represents conditions truthfully.

In studying the table, the following points must be kept in mind:—  
(1) That in each case the depth of water applied is the one selected from each experiment that shows the maximum productiveness with an economical use of water,

or in other words, the proper duty, so that in this regard all the figures have been reduced to an equality.

(2) That all the localities mentioned are in Idaho and have practically the same latitude, and are all within a distance east and west of about 240 miles, so that the climatic conditions must be nearly the same in each case except as affected by the altitude which is shown.

(3) That the experiments were all made by the same office in the same year, thus cutting out many small personal differences that might otherwise arise. Therefore the only variable, generally speaking, that must have affected the proper duty of water is the difference in the kinds of soil and subsoil.

(3) *Preparation of the Land.*—The preparation of the land for irrigation will have a very marked effect upon the amount of water required. In order to use the proper duty of water the land should have as nearly as possible a uniform wetting, and this condition can be approached only after the land has been properly prepared and levelled. If the land be very rough the water has to be held on the land long enough to 'soak up' the high spots, and this necessarily means that water is being wasted on the low spots which will absorb more water than they require or is good for them. Very much the same sort of waste occurs when the land is not properly prepared for spreading the water out over it in an economical manner.

(4) *The Skill of the Irrigator.*—The skill of the irrigator is made up of two distinct elements: first, his cunningness in judging the proper amount of beneficial water that the crop requires, and, second, his cunningness in spreading this amount of water over the land without allowing too much waste in the process. If two different men start off with different ideas of how much water should be applied, the duty of water will naturally be affected by just the amount of difference that there is in their opinions. There are no two practical irrigators who will go about irrigating a certain piece of land in exactly the same way. Therefore, as there is always one best way, it stands to reason that some men will always use more economical methods than others in the actual field manipulation of the water, and hence certain men will always use a far less gross amount of water than others in applying the same amount of beneficial water, which, as before noted, will be whatever amount their judgment dictates.

(5) *Kind of Crop.*—That the kind of crop to which the water is applied has a very direct bearing on the proper duty of water is a fact that would appear to be self-evident and axiomatic. Yet it would seem, for the same locality and soil, that all field crops might be divided into the following three classes, and that in each class the proper duty of water will not have any wide difference:—

- (1) Rowed crops (potatoes, beets, garden truck).
- (2) Grain crops.
- (3) Fodder crops (pasture, clovers and alfalfa).

I have not been able to find any literature which makes this point very clear, and neither does my own personal experience allow me to speak with any assurance in the matter. It is a fact fairly well proved, however, that the three classes require

a greater amount of water in the order in which they are mentioned, and no doubt if careful experiments were made each class would be shown to have its own special requirements and probably a quite wide difference between the classes.

It is generally understood that alfalfa, one of the fodder crops, will require twice as much water as a grain crop.

(6) *Losses in Conveyance.*—Losses in conveyance are sometimes figured on in determining the proper duty of water, but under the terms of the Irrigation Act the duty of water has been understood to mean the duty of water measured at the field intake, net, to the farmer, and therefore losses in conveyance do not find place in this discussion.

In the foregoing discussion I have brought before you five elements which to my mind are the most important in determining the proper duty of water, and I have endeavoured to place them in their proper order of importance.

I now wish to assume the viewpoint of the legislator who desires to have the proper duty of water established in western Canada, and to analyze the five elements before mentioned and to show that they might all, after careful experiment, be reduced to a standard except the character of the soil, which is the most important factor of all, and must always vary, and that a great improvement in fixing the proper duty of water as scientifically and practically correct would be made by making it dependent upon a proper classification of the soil.

As regards climatic conditions, Table 2 shows that these conditions are not widely different over that part of western Canada where irrigation is practiced, but if a careful study was to show that, say, three or four divisions could be made out of the whole area that would have, over each, climatic conditions still more nearly equal, this could very easily be done, and the duty of water, as otherwise determined, made always dependent upon a factor representing the climatic conditions of each district.

As regards preparation of the land, this will undoubtedly always be different with different farmers, but it would be a just act and one that would tend strongly towards the early betterment of conditions on irrigated farms to assume, as a standard in this regard, the most excellent condition of the preparation of the land which it shall be judged economical to attain after determining the kind and value of the irrigated crops that can be grown under the climatic conditions existing.

As regards the skill of the irrigator, arguing along the same lines as in the previous paragraph, it would be just to assume a high degree of skill on the part of every irrigator which to all intents and purposes brings this element down to a constant.

As regards the kind of crops, we take it for granted that different crops will require, under the same conditions, a different proper duty of water, but, on the other hand, any irrigated farm, in order to produce the maximum results coupled with an economic use of water must be put into diversified farming where, with the total amount of water to which he is entitled, the farmer will probably irrigate one out of each of the three classes of crops before mentioned in each irrigating season. I mean by this that no matter what the proper duty of water is found by experiment to be for the three general classes of crops (say they are 1, 2 and 3 acre-feet, respectively),





Irrigation Ranch, Fraser River, north of Lytton.



South Kelowna Land Company teams at Work on New Road.

yet the average proper duty of water for any farm will always be the same, namely,  
 $1 + 2 + 3$

3

acre-feet, or 2 acre-feet for the example, so long as the farmer grows an equal acreage of each class of crop in each year; and, although he will probably not do this exactly, yet it is the end that he should strive after, and can attain without any extra trouble or expense to himself. The proper diversified farm might not have an equal acreage of each class of crop, but the proper acreages of each would always be in about constant proportion, so that this would not affect the argument. This is especially true of the farmer buying water from a company ditch, because in this case he must co-operate with the company and grow a diversified crop, or else the company cannot under practical conditions give him a satisfactory service.

Now, gentlemen, you will see that if you admit the truth of the arguments I have used this far, I have brought you to the point where the only variable quantity is the character of the soil, and I submit that in order to get a proper duty of water that will suit all the different localities in western Canada it must be made dependent upon a proper classification of the soil upon which the water is to be used. How far this classification can be carried out I would not venture to say; this must be determined by the most careful experiments and study, but from my own personal observations I am inclined to think that it would be practical to make three classifications at least, depending upon the soil and subsoil characteristics as I have already outlined them in this paper.

Gentlemen, I wish to submit to you the conditions that exist to-day. Our neighbours to the south of us have done the pioneer work along these lines, and have not only shown how necessary the experimental work is, but the information is all free for us or anybody else to benefit by in so far as it can be applied to our different conditions up here. Surely, gentlemen, we should not allow this opportunity to slip by us, but should benefit by the work that has already been done, and immediately commence such experiments of our own, under our own conditions, as will prove these great economic questions that, in the years to come, are bound to play such an important part in the development of western Canada.

Although this paper is entitled 'The Proper Duty of Water and the Necessary Irrigating Head,' I have as yet made no mention of the necessary irrigating head, not because it does not enter into all but one of the elements that I have cited as determining the proper duty of water, but because I have not wished to complicate the discussion of the questions concerning the proper duty of water any more than was necessary; and also because the two terms are absolutely distinct, and this is one of the points I wish to bring out clearly.

In the regulations issued by the Minister of the Interior under the authority given him by the Irrigation Act, the duty of water has been defined in terms of a certain continuous flow during the period covered by the irrigation season, probably because this has, I understand, been the custom in the United States, and the feeling has gained ground in some quarters that the definition of the duty of water was also meant to regulate the irrigating head. That this understanding is absolutely fallacious must be apparent to every person who has an understanding of practical irrigation, because the duty of water is stated to be 'one cubic foot per second flowing continuously during the irrigation season for each 150 acres,' and it requires no

argument on my part to demonstrate that a flow of one cubic foot per second does not constitute a sufficient irrigating head. It is ridiculous on the face of it, because a farmer having 150 acres of land and receiving his water in a continuous flow of only one cubic foot per second would have to irrigate continuously every day for twenty-four hours in order to put the legal duty of two acre-feet per acre on his land.

It must be distinctly understood that the duty of water defines only the quantity of water it is necessary to supply for each acre of land during each irrigation season, and has absolutely nothing to do with the rate at which the water must be supplied. The duty of water would be more clearly defined as so many acre-feet per acre per season without any reference to the rate of flow, coupled with the period of time, at all.

The term 'proper irrigating head' has no reference whatever to the quantity of water that must be applied to the land during the irrigation season, but defines only the rate of flow at which the water must be supplied to the farm in order that the water may be economically spread over the land, and also in order that it may be spread over the land during that period within which it is beneficial to apply water to the crops on the land.

I would first state in connection with the foregoing remarks on the proper duty of water that, if the duty be made dependent upon a classification of the soil, so will the irrigating head become dependent upon a soil classification, because the irrigating head must be determined by the quantity of water required divided by the time within which it can be applied, and also because a soil which is so impervious as to require only a small amount of water will also be an easy soil over which to spread the water (due to a small seepage into the soil), and, therefore, a smaller irrigating head would be economical in spreading the water over the land.

And again it must always be borne in mind that, so long as the irrigating head is not too large for a man to handle, the bigger it is the better, because this allows a large field to be all covered within a short space of time, thus keeping the growth and ripening of the crop even all over the field.

It will make it easier to understand the arguments to follow if I first state that my endeavour is to show that the proper irrigating head for western Canada should be a large one.

Excluding the climatic conditions, all the elements discussed before us affecting the proper duty of water will undoubtedly affect the necessary irrigating head, but these are smaller details which are all fairly well understood by the practical irrigator, and for lack of time I wish to pass these by without any special discussion and to discuss in a few words other, and, in my opinion, more important elements, which are fundamental and must predominate and determine in western Canada, where our climatic conditions are exceptional as affecting irrigation.

First, our climatic conditions are exceptional in that they vary so very much from year to year in the amount of precipitation that falls during the growing season, and, therefore, the irrigation farmer cannot plan ahead the times during which he will want to irrigate, but must wait and see how much natural rainfall there is going to be. Taking the human element into account, this usually means that the irrigation will be delayed until the last moment when it is seen that the crop must

have water, and then if the crop is to be saved the farmer must have a large irrigating head so that he can spread the water over the field quickly.

Second, owing to the northerly latitude of western Canada the time during which water can be applied beneficially, especially to the grain crops, is short, and it is not feasible to apply water to the land during the whole of the irrigation season. Therefore, it is necessary, in my opinion, to collect careful data over a period of years which will show during what actual period it is beneficial to apply water to the different kinds of crops. Then to assume, for a farm of, say, eighty acres, the ideal arrangements of different crops for diversified farming and to figure out with these several crops on this farm, all needing water at different times, what time the farmer would be able to put in in actually irrigating. Then we would have the two essentials, as near as is practically possible, definitely defined, and by dividing the proper duty of water in acre-feet by the time allowable in which to apply it we would get the necessary irrigating head in so many cubic feet per second that is necessary in order to make a practical success of irrigation under our own peculiar conditions.

In closing, Mr. Chairman and gentlemen, I would say that I have argued on the assumption that a perfect adjudication of all these matters can be arrived at. I know that this will not be possible, but I do think, and I submit the matter for your consideration, that the conducting of careful experiments along the lines suggested in this paper will lead to a much better and truer understanding of these matters than we have at present, and until we do understand these basic points thoroughly we must always be open to the accusation that we are conducting our business of irrigation in a very slipshod manner.

### THURSDAY EVENING SESSION.

The convention reassembled at eight p.m.

CHAIRMAN.—The convention will please come to order. I have pleasure in introducing to you the first speaker of the evening, Mr. M. L. Dean, State Horticulturist of the State of Montana, Missoula.

Mr. THOMAS BULMAN.—I would ask the indulgence of the convention for one moment. I have a resolution here that I feel great pleasure in moving. There will be no discussion to it, and with the permission of the president I would like to read it to the meeting.

#### RESOLUTION No. 15.

Moved by Thomas Bulman, seconded by W. H. Fairfield:

Whereas the study of water conservation through tillage methods is of interest and value to irrigation farmers; and

Whereas the people of our neighbouring province, Alberta, have assumed a most important work for Canada in the entertainment of the International Dry Farming Congress at the city of Lethbridge, October 19 to 26, inclusive;

Be it hereby resolved by the Western Canada Irrigation Association in convention assembled, that we congratulate the people of Alberta upon under-

taking an educational propaganda of such magnitude in behalf of western Canada, and that the president of this association be authorized to appoint ten delegates at large to represent this association at the International Dry Farming Congress, and to use his best endeavour to secure the attendance of the same.

This, gentlemen, I think, is something we are in duty bound to put to this convention, as this work is certainly of as great a magnitude as irrigation projects and is doing in this district a great deal in inducing us to get along with less water, and producing better results. The resolution is seconded by Mr. Fairfield.

CHAIRMAN.—Have I the unanimous consent of this convention to read this resolution? You have heard the resolution. Carried.

Mr. Dean then addressed the convention on,—

### APPLE CULTURE AND BALDWIN SPOT.

MR. CHAIRMAN, LADIES AND GENTLEMEN.—This is an age of advancement and evolutionary changes. As nations, we are proud of our development. As people, our achievements spur us on until the individual operations of every true citizen of all nations has obliterated any evidence of retrogression. It is with eagerness that we watch the varying customs of our fellowmen; their daily fashions come and go with each recurring season, like so many shuttles. Each shuttle carries its own thread of special hue and colour, and always leaves its trace in both warp and woof of the nation's fabric. We are quick to notice all of these things, but we quickly realize the changes that have come about and are momentarily passing in our own countries, in our soils, our crops, our markets and their demands. It is with interest and animation that we read of the discovery of our countries and their resources. We follow excitedly the explorer as he searches out the wonders of new fields. We see the prospector scaling the mountains, tramping through trailless forests, fording the rushing streams. We picture with great vividness his dreams of the luring gold. We see him groping into the future, and at the junction of some stream he sees a beautiful city, in the gap of the distant mountain, great factories, and in his wild imagination the shrill of the whistles almost deafens his ears. Do we envy those men, and think of them as speculators when we read of their dreams of gold mines, and railroad systems carrying to the world's markets the products of the soil? This only is a backward glance at our country's development, and from it let us get a clearer vision of the future. The field is as ripe as in days gone by, and the harvest for the young man is as promising as in the past, but the workers to-day are of a different class. They are men of energy and industry who are willing to transform the plains into profitable orchards and productive grain-fields. To reap the greatest success we must have a love for our work, and it is particularly true in the growing of fruit. William Cullen Bryant points out our duty in his words:—





Four-Year-Old Duchess Apple Tree.

Come let us plant the apple-tree.  
Cleave the tough greensward with the spade;  
Wide let its hollow bed be made;  
There gently lay the roots, and there  
Sift the dark mould with kindly care,  
And press it o'er them tenderly,  
As, round the sleeping infant's feet,  
We softly fold the cradle-sheet;  
So plant we the apple-tree.

What plant we in this apple-tree?  
Buds, which the breath of summer days  
Shall lengthen into leafy sprays;  
Boughs where the thrush, with crimson breast,  
Shall haunt and sing and hide her nest;  
We plant, upon the sunny lea,  
A shadow for the noontide hour,  
A shelter from the summer shower,  
When we plant the apple-tree.

What plant we in this apple-tree?  
Fruits that shall swell in sunny June,  
And redden in the August noon,  
And drop, when gentle airs come by,  
That fan the blue September sky,  
While children come, with cries of glee,  
And seek them where the fragrant grass  
Betrays their bed to those who pass,  
At the foot of the apple-tree.

The fruitage of this apple-tree,  
Winds and our flag of strip and star  
Shall bear to the coasts that lie afar,  
Where men shall wonder at the view,  
And ask in what fair groves they grew;  
And sojourners beyond the sea  
Shall think of childhood's careless day,  
And long, long hours of summer play,  
In the shade of the apple-tree.

This is an age of specialties, with keen competition on all sides. Business methods must be recognized as essential assets just as much as with the banks, and this is doubly true if we make orcharding a business. There is a vast difference in growing apples for home use and attempting to produce them for the markets of the world.

We cannot deny that there is a fascination in sitting in the shade of one's own apple-tree, but this pleasure is much the greater if we have reared the tree with our

own hands. As has been said, 'Tis strange how we learn to love the things we plant and tend; Every tree in that dear orchard seems like some dear old friend.'

The location of the orchard is the first point for one to consider, after having determined to enter the horticultural arena. The best location is that place which contains the greatest number of desirable conditions, after all of the undesirable ones have been eliminated. Absolute drainage of excess water is necessary, as is also good air drainage. Good soil, with proper slopes, and in some locations protection from severe winds, are indispensable.

The proper selection of nursery stock of such varieties as are adapted to the conditions under which they are to be grown is of paramount importance.

Close proximity to markets is desirable, and if long shipments are necessary, the choice must be made accordingly.

Preparation of the soil cannot be too thorough. Poor preparation is responsible for many trees being stunted in the outset; the tiny tree being unable to get the proper amount of food in suitable condition cannot make a strong, thrifty start, and a stunted tree never overcomes the handicap.

The plan of the orchard should be worked out carefully, the contour of the land considered, and a system of straight rows adopted. This adds to the attractiveness of the orchard, and aids in cultivation, irrigation, and general orchard operations. Sufficient space should be given to the trees if their best development is desired. My experience and observation is that all standard apple-trees should have not less than twenty-four to thirty feet of space, and some varieties need even more.

True, the tree must be planted at the proper depth, the soil well firmed about the roots, but if that soil is not in a condition that the plant-food is liberated and easily secured by the trees as soon as growth starts, the tree cannot make its best growth, and the first three years' growth marks the future of that tree.

Whether in irrigated or arid sections, systematic, thorough tillage is necessary. An excess of water has injured more trees than has dry weather. Cultivation conserves moisture; water applied without cultivation may be detrimental.

Pruning should be systematically done for the first three or four years, developing a skeleton or frame work for the top, low down and well balanced. Excessive pruning is then unnecessary until the tree comes into fruiting. If heavy pruning of young trees is followed annually it will retard the bearing age.

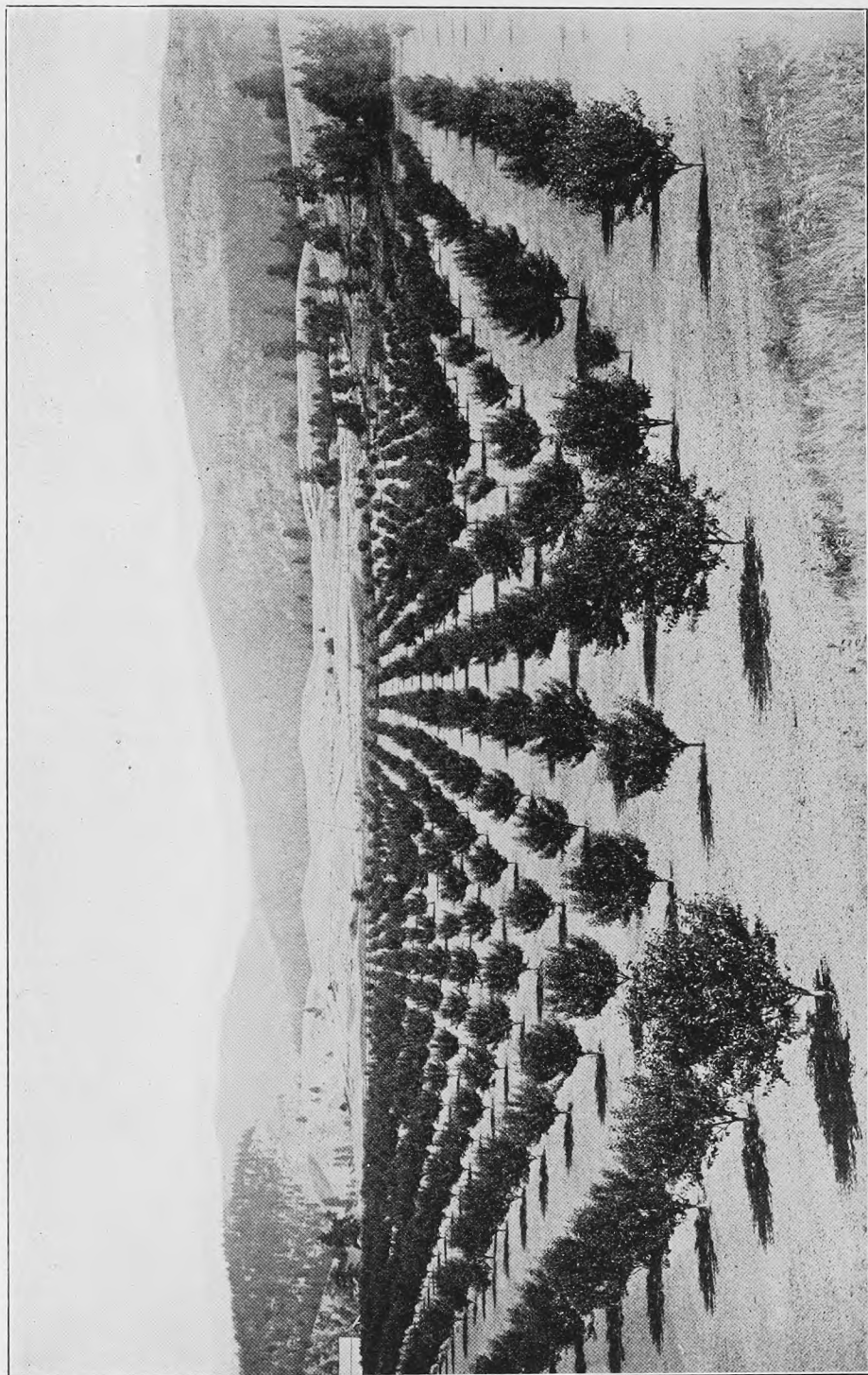
#### PESTS.

It is needless to say that control of the pests is necessary, because every successful fruit-grower must have a good understanding of the habits of our insect pests, and know how to control them by the use of the spray solutions applied by proper methods. He must also know what to use for fungus diseases, and be familiar with the treatment for bacterial troubles, and yet there are some pests that baffle the skill of our scientists.

#### HARVESTING AND MARKETING.

More fruit is injured annually by careless handling than it would take to pay for the harvesting of the entire crop. The operation must be done with skill, and under well organized system if the best results are to be obtained.

Marketing by an organized system, yes, emphatically yes.



Orchard on the Kelowna Land and Orchard Company Bench, near Kelowna, B.C.

## BALDWIN SPOT.

That all animal and vegetable life has its enemies nobody will dispute. That some conditions are more favourable for the development of these enemies all will concede.

The fruit sections of the entire Northwest are probably freer from orchard pests than is any other part of the western continent. New territory, isolated sections which are sparsely settled, and legislation in preventing the introduction of these things is what makes conditions more favourable than they are in the older sections of the country.

As diseases follow the human family into the congested centres, so insects and diseases will follow our orchard developments in proportion to its increase and the care given for the prevention and extermination of these diseases and pests.

The insect pests and fungus troubles we can control by the use of spray solutions applied systematically according to the formulæ and directions laid down by our experiment stations.

Bacterial troubles require radical treatment, and many of our blights only succumb to extermination by the use of the knife and fire.

Probably nothing has baffled the skill of our investigators and plant pathologists more than 'Brown Spot' or 'Baldwin Spot' or 'Stippen' of the apple. We find by carefully viewing the history of this disease that the German scientist, Soraner, named it 'Steppechwerden der Aepfel' in 1879, which has since been called 'Steppin.' It was described in the United States by Jones, of Vermont, in 1891, and called the 'Brown Spot of the Baldwin Apple.' In Australia, in 1892, Cobb called it 'Brown or Bitter Pit.' In 1896 we find a report from Craig, of Canada, who calls it 'Dry Rot,' while Stewart, of New York, and Clinton, of Connecticut, called it 'Baldwin Spot.' In 1908, Professor Charles Brooke, of New Hampshire, distinguished between this disease and another very similar one, but of fungus origin, and named it 'Fruit Pit,' and the fungus disease 'Fruit Spot.' It has been generally conceded that, as the Germans were the first to name the disease, and clearly indicate the non-parasitic character of it, their name 'Stippen' should be adopted. It means a pitting or dipping, which is a strong symptom of the disease.

These symptoms are well known by apple growers in most sections of the world. It attacks only the fruit, and the first outward evidence is a discolouration and slightly sunken spots over the surface of the apple. They are usually more numerous toward the blossom end of the fruit. On red apples the colouring is a darker red; on green, usually a darker green. As the apples ripen the pitting extends deeper, but the skin remains normal and is not often fractured. Upon cutting the fruit we find dead, brown, spongy tissue extending toward the core; often the brown spots are found throughout the pulp of the apple, not coming to the skin, and having a bitter taste, and this has led some to call it 'Bitter Pit.' The principal distinguishing characteristic between this and the 'Fruit Spot,' by Brooks, is the absence of black pimples at the centre, which are the fruit-bodies of the fungus of the fruit spot.

'Stippen,' 'Bitter Pit,' or, as often called, 'Baldwin Spot,' is frequently quite serious in some sections of the Northwest, and is reported to be serious on some varieties of apples in Australia and South Africa. It is quite like the 'Fruit



Spot' in appearance, yet upon close observation, with well developed cases the colouring and depressions are quite different. They appear like minute bruises, but soon develop into conspicuous, sunken depressions, showing different shades of brown colourings. These colourings often show through the skin, but later come to the surface and the surface becomes a dark brown colour. In the later stages we find that the small pits become united into large ones, forming bands of diseased tissue that follow the irregular course of the food, constructing channels. These brown spots are common in storage apples. Usually abnormally large apples are attacked the worst, and it causes a premature ripening of the fruit, similar to the attack of the 'Yellows' of the peach.

The fungus fruit spot called the 'Baldwin Spot' can be controlled by spraying with the fungicides Bordeaux Mixture or Lime Sulphur in dilute mixtures.

'Stippin' is a physiological trouble and cannot be controlled by spraying. The cause set forth by our German friends, as well as by English and American pathologists, is that it is due to an unequal distribution of water during the growing period of the apple, thereby destroying the cells of the tissues. All agree that the character of the season has much to do with the disease, which is usually more severe in its attacks in dry seasons. This being the case, uniformity of water-supply seems to be the only suggested remedy. Some suggest:—

- (1) Tile drainage, which removes excess water and provides moisture in dry seasons;
- (2) Systematic thorough tillage, conserving the moisture, aërating the soil and promoting normal root action;
- (3) Cover crops sown at the proper time to consume the surplus plant food or water.

Or in other words, the system which promotes a uniform, normal growth of tree and fruit throughout the entire season is the best antidote suggested for the 'Stippin' or 'Bitter Pit.' (Applause.)

CHAIRMAN.—Ladies and gentlemen, the next item on the programme this evening was to have been an address by Mr. P. H. Moore, Superintendent of the Government Experimental Farm at Agassiz, but we have received a telegram at the last moment stating his inability to be present. His address, however, will be included in the report at this point.

## STOCK AND DAIRY.

By P. H. MOORE.

The subject of this short paper, 'Stock and Dairy,' being large enough to take up the time of a whole convention at least two days long, you will understand why some things are very brief when one must put some of the most important ideas into a fifteen minute space.

We will speak chiefly from a dairy point of view, for this reason, namely, that meats as a rule can be shipped greater distances and cheaper than can some of our dairy products, with the exception of butter and cheese. Almost every district under

irrigation has of necessity a dense population, probably a town near by, and every one with taste needs fresh dairy products, even in the midst of entirely fruit-growing belts; the 'Tin Cow' is not good enough. For these districts I will chiefly speak, and for the purpose of brevity, divide my paper into the following short headings:—

1. Kind of cow.
2. Her care.
3. Food available and amounts.
4. Farm benefits derived.

#### THE KIND OF COW.

The first thing to consider is the breed a man most fancies; then, whether it will stand the particular climatic conditions, and whether it is adapted to the kind of work it is going to undertake. All must give way a certain amount to the others in order to get the best possible whole. For the small holder who wishes to keep a cow or two to supply his own household or that of a neighbour with a good quality of milk and cream, one of the smaller breeds of cattle would be most appropriate; or again, if one wishes to go into this dairy business chiefly, and supply a nearby town with milk or cream, then probably the breeds giving a larger flow of milk will suit better. But at the best a breed is only a breed, and there are good and worse-than-no-good in all breeds, for individuals and strains are worth more than breed. A cow, like a tree or a field, that will not produce more than it takes to keep it, when handled properly, is of no use to any one. Buy the cows to the best of your ability, but do not stop there. Conditions of the country, or the 'other fellow,' may best you up to this point, but if the cow beats you afterwards it is your own fault. Know how much food she eats, how much milk she gives, and the value of both; then she has a poor chance of robbing you, at least for very long. It is a little labour, but it is good business, and good business pays.

#### CARE OF THE COW.

To get good returns from a cow she needs care. Everything that goes to make 'cow comfort' will mean to you money—of course, when not carried to a faddish degree. Kindness is required in spite of any cussedness which she may show (for a cow cannot think or reason as we are supposed to do), coupled with generous food supply of the right sort, a comfortable stable, which means a good bed, dry, light, and with plenty of fresh air without freezing to death, and regularity of food and attention, which costs one but little, and brings returns.

#### FOODS AVAILABLE, &C.

In nearly all irrigated sections all the coarse foods and some concentrates can be grown: alfalfa, the king of all fodder crops, corn, mangels, beets, peas and grains. On land so valuable it would hardly pay to put cows to pasture during the summer, but to feed them in yards or stables from food cut green in the fields. It is a little more work, but it is a saving of land, food and fences, and results in the greater comfort and better condition of the cows; thus a greater supply of milk is produced. It also results in more manure, which in turn makes better land. The

amount of land necessary to keep a cow through the summer by this method depends upon the richness of the soil and what can be grown upon it, also how the crops are handled. Making the summer feeding season from May 1 to October 15, or 168 days, and feeding at the rate of three-quarters of a square rod per day (an average amount only), it will take a little less than three-quarters of an acre per cow for a season when feeding alfalfa, oats and peas, or mixed grains, and for corn at the same rate it would be about one-half of an acre. As before stated, this rate is not exact, and many factors go toward influencing it. You have all seen crops of corn that a cow could not begin to eat a quarter of a square rod in a day, and you have also seen the crops where a square rod would not make a meal for the same cow, and the same applies to other crops, so as this amount has often been tried, and the figures used about average the varied conditions, I make use of them. One could not, of course, keep cows on just one of these crops alone, but would have to change from one to another as the season advanced, somewhat after this fashion: May 1, winter rye, vetch and wheat mixed, to last until the earliest alfalfa; then peas and oats, after which corn, or third cutting of alfalfa. All these crops sown at the time most suitable to the local conditions, and in amounts to suit the needs of the stock and productivity of the land, as this is the great secret of those who have made a success of soiling. A silo, where five cows or more are kept, will be found most useful and profitable both for summer and winter. Much might be said about this method of storing food, but it would be wasting time to repeat the old story and truths regarding it, but I only mention it as the cheapest and best storage for rough crops. It is best when built of staves or concrete. The latter is the most expensive at first cost for material, but considering the high price of carpenter labour, it is just a question if concrete cannot be put up much cheaper than is generally supposed. One great fault with the fir silo in British Columbia is the great expansion and contraction qualities that it has. This spring, in our silos at Agassiz, one could put one's fingers between the staves only five feet up, and at the top of the silage they are perfectly tight, but, when empty, they were only kept upright by tightening the hoops to the limit. These must be loosened again when the silo is filled, or something has to break. I must, however, add that the silage kept to perfection, and after once leaving the surface not an ounce was wasted. This, of course, should be equal in both the stave and the concrete silo. A great many kinds of forage have been tried in silos with varying success, but for dairying purposes there has not yet been found anything that will equal Indian corn (maize). Even in our cool, moist climate at the coast, last year it produced the cheapest form of roughage that we had, and in addition to this it was enjoyed by the stock and had no strong smell. For winter needs, one would require for the 197 days, which is a generous allowance for winter, a ton and a half of hay, two tons of mangels, and four tons of silage per cow, to feed at the rate of hay, 15 pounds, mangels, 20 pounds, and silage, 40 pounds, daily, with mixed grain to feed at the rate of from one pound of grain for every three or four pounds of milk produced, which would mean from 500 pounds to a ton, depending upon her lactation period. Thus, if alfalfa yields six tons in three cuttings per acre, corn twenty-eight tons per acre and mangels twenty-four tons per acre, it will take little over an acre to keep a cow a year in the necessities of life, but to this must be added her grain food and the cost of labour, two items

depending so much upon the man at the head of affairs that it is too large a problem to handle here, but, provided that one man, who could handle ten cows easily, costs \$720 per year, and grain is worth 1½c. per pound, and that the cows are worthy the name, there should be a dividend.

#### SIDE LINES.

If a man is selling cream or making butter he also has two branches to attend to, which, when handled with a little care, give him good returns; they are hogs and poultry. Both of these take labour, but they blend so well with the cow, and the prices for their products in this western country are so good, and the rapidity with which one can turn over one's money makes them factors not to be left out or lost sight of when thinking of the dairy business, especially if conducted from the standpoint of cream or butter.

#### FARM BENEFITS DERIVED.

Aside altogether from the standpoint of a family, community or town being supplied with a respectable quantity of fresh dairy products, there are some other benefits to be derived from a little mixture of the cow along with fruits, grain, potato or alfalfa growing. It helps in one of our greatest questions, that of labour, by keeping it permanently. Less labour in the dairy in summer allows some help to be given outside, and one gets a better quality of labour, for one can offer inducements for the steady man to stay the year round on the one place.

As history has shown us, there are few soils in the world that are inexhaustible, thus the supplying of farmyard manure tends not only to retain the fertility of our soils but to improve them, and to better the physical condition also, and as a well fed dairy cow, a bunch of young pigs and some poultry give us some manure of the best quality, they are live factors in this movement of agricultural conservation.

The cultural methods that should be practiced to grow crops sufficient to maintain dairy cows on any farm are those that tend to improve any land or farm, to free it from weeds, to improve the soil, and to make it produce larger and better crops; so with this in view a man, no matter how or where, who takes a piece of land and not only makes what is necessary from it, but leaves it better than he got it, not only does something for himself and family, but for the community and the nation; and, gentlemen, he is wanted in Canada to-day.

CHAIRMAN.—I am glad to announce that we have with us this evening one of the most celebrated engineers in the British Empire, Sir William Wilcocks. I understand his specialty has been the study of irrigation methods. He is the designer of the great Assouan Dam, the largest of its kind in the world. Sir William happened to be globe-trotting, and passing through British Columbia heard of the convention at Kelowna and the attractions of the Okanagan valley, and so is with us this evening. (Applause.) Sir William will speak to us on

## IRRIGATION LESSONS FROM THE OLD WORLD.

MR. PRESIDENT, LADIES AND GENTLEMEN.—Living among the Arabs for the last thirty years, I hesitated at first to say anything at this meeting, as they greatly respect silence in the East. ‘O man, God gave thee two feet, two hands, two ears, two eyes and one tongue.’ However, I have remembered that I was born sixty years ago in a tent on an irrigation canal in northern India, and have spent my life in those arid lands where, in President Roosevelt’s words, it is water and not land which measures production, and that, therefore, I might say something to-night on the subject of eastern irrigation.

The spirit of irrigation in the East is the spirit of the homestead. The intense cultivation, the need of many heads and many hands to weed, to care for live stock, to gather in the varied harvests, to manipulate delicately and to trim carefully, justify one in slightly changing the words of the Psalmist and saying that ‘irrigation and marriage meet together, children and prosperity kiss each other.’ Children in towns are a source of expense, on irrigated farms they are a source of wealth. In Egypt children four or five years old take out huge buffaloes to pasture and control them by a string tied to the horns and passed around one of the ears. Boys of eight and nine lead out sheep and guide them so that they clean the land of weeds and confirm the truth of that old English saying that the feet of sheep are shod with gold. Girls and women cut and bring in clover, pick cotton, clear rice-fields of weeds, prepare the fuel and look after the house. All are busy from morning to evening, and the larger the number of hands the cleaner the crop and the more plentiful the yield. In the old world, the East, a man is not considered fit to sit down among respectable people if he has passed a certain age and is unmarried, and, although I did not know it then, I know it now that it was this spirit of irrigation which prompted me in my younger and more romantic days to write down on the first page of my note book those delightful lines of Burns:—

To make a happy fireside clime

For weans and wife.

Is the true pathos and sublime of human life.

I know that in the younger West, book learning is considered the royal road to wisdom, even though it is only one child in ten who really benefits, while nine are being brought up on indigestible mental food. In the old East, the brilliant children are allowed to learn books, while the others are brought up in intimate knowledge of their parents’ professions. On farms where all the labourers are members of the house, there are none of the strikes and none of the unrest in which the West lives and moves and has its being to-day. I was not surprised, therefore, to find that the home-loving Mormons had the only cozy, comfortable and settled villages I saw in Alberta. Raymond, Magrath and Cardston had a settled, sitting-down look about them which reminded me of villages in Egypt and India. I know that Mormonism has few friends in this country, but in all matters we should, I think, remember Shakespeare’s sage words:—

‘There is some soul of goodness in things evil  
Would men observingly distil it out.’



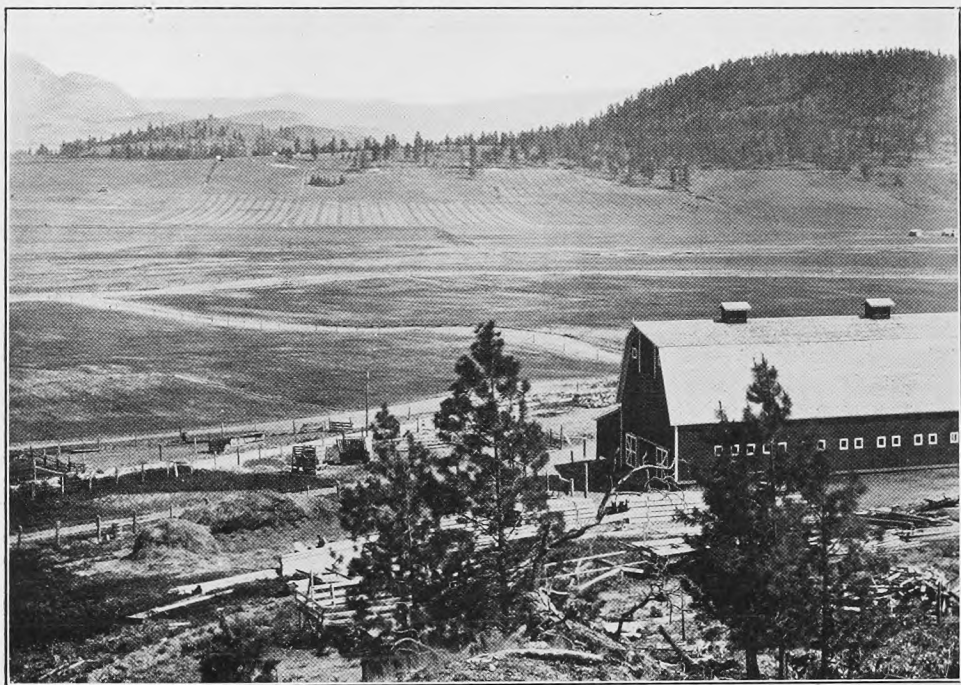
We can learn something even from the Mormons, who are the nearest people here to the irrigators of the old Eastern world. Their farmsteads are clustered together, and they secure in the country some of those privileges which make town life so attractive. A man walks a little further to work, and the ploughman homeward plods his weary way along a longer track, but his life is more sociable once he gets home. I wonder how many people in towns would drop in of afternoons and see each other if every one had to walk across a square mile of country, or half a square mile, to see his or her neighbour. The solitary, homeless-looking houses which lay scattered over the bare veldt looked more like rogue elephants living their unsociable lives than anything else I have seen in my life. Where I was straining my eyes for bunches of children I saw only bunches of horses or bunches of pigs. And yet, when you pay ten shillings a day for a labourer, bunches of sturdy boys and girls are worth their weight in gold. While you people here are asking for colonists from home, the East produces its own colonists, better suited to the country and infinitely cheaper than imported labour.

A small well worked farm with irrigation pays much better than a large farm which cannot be kept in good condition, and here comes the difficulty in this country with its severe winters. A farmer, however small he may be, could not exist in a farm which cost less than £200 to build. Now £200 spread over 160 acres is £1 4s. per acre, and spread over forty acres is £5 per acre. It is the cost of the farmstead which is the serious side of small farms in England, and it is still more serious here. Agitators in England abuse both the English landlords and the so-called stupid agriculturists who stand by them, but the agriculturists know that it is not the price of the land but the cost of the farm buildings which stand in the way of small holdings. Big holdings in irrigated land will be eaten up by their own weeds, and the only way to manage is with small holdings and comparatively expensive farm buildings. In Alberta the Canadian Pacific Railway charges very moderately for its irrigation water, but the price of the land is high for small holdings, and the rate of interest for borrowed money is excessive. Government land banks with very moderate rate of interest as they have them in paternal (falsely called retrograde) countries like Russia are one of the needs of 'Irrigated Canada.' Such money would be lent only to bona fide settlers making themselves at home on their lands, and not to the 'caterpillars of the commonwealth,' who only buy either to half develop and then sell at a profit and clear out after skimming the cream off the land by exhaustive crops, or to sit and wait for the unearned increments.

Rotation of crops and, wherever possible, the keeping of live stock is the life of irrigated lands in the East. Cereal crops are always followed by leguminous crops. The leguminous crops are the mortal enemies of the weeds of the cereal crops and vice versa. Good leguminous crops provide all the nitrogen required, while small quantities of superphosphates insure heavy yields of corn and tend to hurry up the ripening of the crop. Irrigated land in Egypt has been heavily cropped every year, and over large areas twice every year, and it is as rich to-day as it was 7,000 years ago. Rotation of crops has secured this, backed up always with as many cows, sheep and poultry as the land can carry. The average holding of a well-to-do family in Egypt is two acres. When there is no work on the farm some members of the family are always working at earthwork or portorage somewhere. An entire

family of men, women and children and a few donkeys will take a quarter of a mile of earthwork digging somewhere and finish it at some fixed rate and time. Seeing such folk one understands why Abraham's wealth was described as consisting of men-servants and he-asses, female-servants and she-asses.

Every canal bank in India is a miniature forest, and if the government forest department out here were to cover the banks of the canals in the bare and naked prairies with poplars, willows and suitable trees, the country would begin to look quite homelike. Wherever trees are growing in shingle they seem to flourish, and it has struck me that if holes some four feet deep were made with jumpers and filled with shingle and loose top soil and trees planted in them and watered once or twice they would soon have their roots comfortably housed out of the way of the frost. Lord Kelvin has proved at Glasgow that small meshed wire netting round a farm-



Central Okanagan Land Company Lands, Kelowna, B.C.

stead makes a better windbreak than any masonry wall however high, and delicate plants can live behind it. I have promised my friends here to go to Glasgow as soon as I return to Liverpool and send them out full details of the netting Lord Kelvin has used. It might help many a farmer to secure a decent belt of trees around his farmstead.

All the regulating works on the rivers are much bolder here than in the East; where the welfare of the millions of people is concerned we cannot afford to run any risks. Time alone can tell whether the boldness of the engineers here is justified or not. No one here has seen the tragedies the East has witnessed. In the

Euphrates valley I have walked down a canal 250 miles long, 400 feet wide and 15 feet deep, which irrigated probably one and one-half millions of acres of land, and where it is conjectured that over two millions of people must have died of hunger in a year or two when the head-works holding up thirty feet of water on the Tigris river were swept away. By the time Canada is as densely peopled as that, the engineers will play for safety as we do in the East. None of our works on irrigation canals in the East are temporary. All the works are as solid and permanent as money can make them. We all say that the original works can be cheaply built in the dry; once the canal has begun to carry water and establish water duties, works are costly indeed and attended with risks.

The question of water-rights has been settled in the East from the remotest antiquity. Water has attached to it duties as well as rights, and the state is the sole proprietor of every drop of water which flows in any stream, and of the channel in which the water flows, and it never concedes its rights to any one. When Victor Emmanuel amalgamated all the Italian states his government was face to face with hundreds of varieties of water-rights by individuals and corporations. An ordinary man would have hesitated, but Count Cavour was no ordinary man. He was one of those strong men a country about to become great produces. With a stroke of the pen the water was made the property of the state after the wise Eastern way, and commissions appointed to examine into and fix the compensation due to all holders of rights and patents. Modern Italy owes much of its prosperity to Count Cavour's action. If the Government of British Columbia were to declare itself owner of all water-rights and appoint a commission such as Count Cavour did to fix the compensation righteously due to concessionaires, you would settle this vexed question straight away, and have time to devote your energies to new projects without any misgivings. I say it in no spirit of man-pleasing, but as a simple matter of fact, that your government in Canada enjoys such a reputation for honest dealing, and deservedly enjoys it, that you would in this country truly and righteously judge every case on its merits and no one would suffer any wrong. If Cavour inspired his generation with such a love of fair play that all the claims of Italy (and some of them were many hundreds of years old) were equitably settled, you men of northern blood would not be one whit behindhand.

In the East to-day all the land needed for future canals and drains is taken up and the works begun before irrigation water is allowed to enter the canals. If the drainage system of a country is suited to a rainfall of 16 inches, and you make the rainfall equal to 40 inches by artificial irrigation, you must make provision for this extra water in the drainage lines. When a man buys a plot of land here he signs an agreement to allow his neighbours a right of way for their irrigation water. He should also sign an agreement to allow his neighbours a right of way for their drainage water. It is only in this way that you will be able to exercise the demon of alkali effervescence which is ever ready to enter the plot of land out of which the demon of drought has been driven by artificial irrigation.

In the East the irrigation farmer levels his land with a care and skill which testify to his long experience of the value of an even grade for securing the maximum yield from the minimum of water. The economy of water to be gained by good surface tilth the East is learning from you western farmers.

Mr. President, ladies and gentlemen, I thank you for listening to what I have had to say on this subject of irrigation, the oldest and youngest science of the world. Here in this new country, in this twentieth century, the words of this most ancient poem are as true to-day as they were over fifty centuries ago in far distant Babylonia:—

O thou river, who didst bring forth all things,  
When the Great Gods dug thee out  
They set prosperity on thy banks.

(Applause.)

CHAIRMAN.—Ladies and gentlemen, I think I express the sentiments of this meeting when I say that we feel deeply indebted to Sir William for the very instructive and interesting address he has just given us. (Applause.)

The Committee on Credentials reports as follows:—

Delegates accredited. . . . .	153
Visitors. . . . .	21
Certificates handed in. . . . .	53

The next item on the evening programme is an address by Mr. R. M. Winslow, Provincial Horticulturist, Victoria, entitled, 'Some Climatic Conditions Influencing the Duty of Water in British Columbia.'

## SOME CLIMATIC FACTORS INFLUENCING THE USE AND DUTY OF WATER.

By R. M. WINSLOW, Provincial Horticulturist of British Columbia.

MR. CHAIRMAN, LADIES AND GENTLEMEN.—This paper is a discussion of some of the climatic conditions of the interior of British Columbia as they affect the duty and the application of water for irrigation.

It is inspired by a study of the weather records of the province which is being made by our department to determine more accurately than we have heretofore been able to do, the climatic limitations of the development of our various horticultural industries. We have learned that our various interior valleys have distinct individualities which will modify considerably their ultimate fruit and vegetable production, and we find that many of these slight differences in climate are likely, in their character, to materially affect irrigation practice. Believing that the information gained from an analysis of the records would result in the better conception of the functions of water in our orchards and fields, I have ventured to present them before you to-day.

Besides the total annual precipitation, which is the only climatic factor that usually receives consideration, we will discuss its seasonal distribution, the rate at which the rain falls, the amount of snowfall, and the amount of loss by run-off, both of melted snow and heavy rain. While our discussion cannot be complete and final (first, because the records are very far from complete, and second, because irrigation is too new for us to compare our conclusions with the results of actual practice), we will at least consider all of these factors as possibly modifying the usefulness of the annual precipitation.

More important in our arid valleys than the precipitation and its absorption by the soil, is evaporation—more important because nearly all the water supplied annually by irrigation is lost by evaporation from the soil surface, or through the leaves and stems of the growing crops. Of evaporation, there are, unfortunately, no records of studies made in British Columbia. We can, however, infer a great deal about the relative losses by evaporation in different districts by a knowledge of the climatic factors upon which evaporation depends, viz., the length and intensity of the growing season, the prevalence of wind, the percentage of humidity in the air, and the amount of sunshine.

#### ANNUAL PRECIPITATION.

The larger Dry Belt of southern British Columbia lies parallel to the Cascade range, with a width of about 200 miles along the international boundary, and extends north about 250 miles, or beyond the bounds of the present fruit-growing areas. As will be seen by the total precipitation lines on the map (which, I might explain, refer only to altitudes between 800 and 1,800 feet), the precipitation is least nearest the Cascades, amounting to about eight or ten inches annually. Old records give Spence's Bridge, and Lytton, eight to nine inches per annum, while Kamloops, on a ten-year average, has 9.30 inches. Okanagan Falls, according to a private record, has about eight and one-half inches; Keremeos about nine inches, while Midway, according to a one-year's record, has 9.87 inches. The 'ten-inch line' passes through Summerland with 9.89 inches, and Penticton with 10.96 inches, according to records for the last three years. Grand Forks is credited with 11.82 inches on a short record. We notice also Vernon and Coldstream valley, the latter with 14.3 inches, the former with probably about 13 inches. Kelowna also comes in this belt with a total of 12.64 inches annually.

Between 15 and 20 inches, which is usually accepted as under dry-farming conditions, comes the belt in which lie Salmon Arm and, probably, Armstrong. This belt does not appear again in the Okanagan, but we find it in the lower part of Lower Arrow lake, around Trail, and in the Pend d'Oreille. The next belt, having from 20 to 30 inches, has in it Enderby, 21.43 inches, and runs through the middle of the Arrow lakes country, taking in Nelson with 26.83 inches, and Creston section, for which we have no record. Districts having above 30 inches I have not subdivided, but I would say that they include Sicamous, Revelstoke (with 42 inches), and the Upper Arrow and Upper Kootenay lakes.

It will be seen that in the districts in which irrigation is commonly practiced, there is a considerable variation in the amount of precipitation. As a striking instance, we notice that Vernon has about five inches more than Kamloops, and two inches more than Kelowna, which, in turn, has two inches more than Lower Okanagan lake points. Now, if the five inches, which Salmon Arm has in excess of Vernon, makes the difference between non-irrigation and irrigation, as has occurred in practice at any rate, then we must conclude that there is some irrigation-saving effect in the five inches which Vernon has more than Kamloops.

The second Dry Belt of southern British Columbia is east of the Selkirks, and in it lie the Southwestern Kootenay and Upper Columbia valleys. Precipitation at Tobacco Plains and Elko is registered at 18.49 inches; at Cranbrook, 16.45 inches;



at Wilmer, probably about 13 inches, and at Golden, 16.57 inches. Irrigation is practiced to a large extent only in the districts surrounding Wilmer, and dry-farming methods are bringing satisfactory results at Cranbrook and Golden. We will discuss the duty of water in this dry belt further in a few minutes. At any rate, we may remark that the duty of water should be somewhat higher than in the Southern Okanagan or Thompson river valleys.

TABLE 1.

TOTAL ANNUAL PRECIPITATION AT BRITISH COLUMBIA INTERIOR POINTS, SHOWN FOR EACH THREE MONTHS.

Station.	Length Record.	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Total.
		Inches.	Inches.	Inches.	Inches.	Inches.
Spence's Bridge .....						8.50
Kamloops .....	1901-1910...	1.97	2.24	3.05	2.04	9.30
Midway .....	1901-1902...	2.27	4.12	1.92	1.56	9.87
Summerland .....	1908-1910...	1.92	2.88	2.87	2.22	9.89
Penticton .....	1908-1910...	2.73	2.45	3.65	2.13	10.96
Grand Forks .....	1910 .....	2.97	2.95	1.54	4.36	11.82
Vernon .....	1902-1910...	3.43	3.60	4.13	3.16	14.30
Kelowna .....	1901-1910...	3.03	2.91	3.30	3.40	12.64
Salmon Arm .....	1907-1910...	5.42	3.73	4.60	4.96	18.71
Enderby .....	1910 .....	4.57	4.18	3.39	9.29	21.43
Nelson .....	1904-1910...	8.39	5.87	4.74	7.83	26.83
Revelstoke .....	1904-1910...	13.78	7.46	6.88	11.15	42.27
Tobacco Plains and Elko .....	1906-1910...	3.86	5.74	4.63	4.26	18.49
Cranbrook .....	( 1901-1902- ) ( 1904 .....	4.44	5.09	2.22	4.70	16.45
Golden .....	1902-1910...	4.06	2.91	4.02	5.58	16.57

## DISTRIBUTION THROUGH THE YEAR.

It is important to know when the rain comes, as well as how much comes in a year. In some districts the winter precipitation seems to be stored quite efficiently in the soil for summer use. The Thompson valley and Lower Okanagan valley have an average of about four inches precipitation from the first of October to the end of March. Clearly an irrigation at the beginning of the growing season will be necessary in those districts. Kelowna receives, however, about 6.4 inches, and Vernon 6.6 inches in the same period. It is notable that the increased precipitation over the minimum falls very largely in the winter months, a most desirable feature, as it means a greater snowfall and better absorption by the soil at a time when evaporation is low.

As will be noticed by the table, Salmon Arm receives 8.13 inches in the six summer months, and Vernon 7.73 inches, a difference of 0.4 inch. The great usefulness of the winter moisture that thus carries the first mentioned district through the summer, when irrigation is required at Vernon, is very obvious.

## VARIATIONS YEAR BY YEAR.

If the natural moisture is to be utilized to avoid over-irrigation, either it must be fairly constant year by year, or the grower must know something of its variations. Table No. 2 shows a difficulty here in the case of Vernon. The year 1907, for

instance, shows a total precipitation of 18.11 inches, while 1908 has only 9.94, or only about one-half the amount. The irrigationist must, therefore, study the soil conditions, and especially be informed at the beginning of the season as to how much moisture is really in the soil. This it is quite possible to do, either by the use of a soil auger or a post-hole digger.

TABLE 2.

YEARLY VARIATIONS IN PRECIPITATION ILLUSTRATED BY VERNON AND SALMON ARM.

Station.	Year.	Precipitation.	Station.	Year.	Precipitation.
Vernon .....	1903	17.96	Salmon Arm .....	1907	21.83
	1904	11.04		1908	15.55
	1905	12.99		1909	21.50
	1906	14.87		1910	18.42
	1907	18.61			
	1908	9.94			
	1909	14.04			
	1910	15.26			
Average.....		14.03	Average.....		19.33

The table showing the precipitation at Vernon and Salmon Arm for a period of years illustrates very forcibly how closely irrigated and non-irrigated districts grade in together. We notice, for instance, Salmon Arm, 1908, 15.55 inches, and Vernon, 1907, 18.61 inches.

#### THE CHARACTER OF SUMMER RAINS.

The absorption of summer rainfall depends largely on the rate of fall. Even with the most receptive soil, it is not likely that less than one-half of an inch of rain will do more than wet the mulch, while on the other hand a deluge is likely to be largely lost by run-off. We have not been able to get official records on this point, but it would seem that about half the precipitation in the Dry Belt sections comes as showers, which by wetting the mulch do more harm than good. Fortunately, a large portion falls as really heavy rains, of which a great part is absorbed. With alfalfa and other crops entirely covering the ground, the light showers are of much more importance, because these crops can make use of them to advantage.

#### RUN-OFF OF MELTED SNOW.

When the ground below a coat of snow is frozen the snow melts from above, and is largely lost by evaporation and run-off. Where the soil is not frozen, melting takes place largely from below, and nearly all the snow is absorbed by the soil. It is only rarely that much of the snowfall is lost by run-off in British Columbia, and no records on this point are available. We mention the above, however, because it should come to the attention of the fruit-grower, whether an irrigator or no. We might also point out that run-off could be largely prevented by the use of cover crops or by having the surface of the soil rough by fall ploughing.

## FACTORS INFLUENCING THE CONSERVATION OF MOISTURE.

Next to the actual amount of the annual precipitation, the fruit-grower is interested in the conservation of the moisture that the land receives, whether it be natural or artificial. Soil moisture is disposed of in several ways: by drainage through the subsoil, and by absorption into the tissue of the plant, but principally by evaporation from the soil surface, and transpiration from the surfaces of the foliage and the fruit. The amount of evaporation is, therefore, a matter of direct consequence. Unfortunately, no records of evaporation have been made in British Columbia, and none directly applicable to our conditions have been made in the United States. The records of the United States Department of Agriculture show that evaporation in the Panhandle of Texas is about double that in North Dakota. In other words, that evaporation doubles with a doubling of the number of heat units received, the first-named having about 22,000 heat units, while North Dakota has about 11,000.

Evaporation may be influenced not only by the length and duration of the growing season, but also by the amount of sunshine and cloudiness, the humidity of the air and the amount of wind.

## LENGTH AND INTENSITY OF THE GROWING SEASON.

Table 3 shows the length of the growing season, the temperature of the six hottest weeks, and the mean annual temperature of various stations in British Columbia.

TABLE 3.

Station.	Length of Record.	Length of Growing Season.	Total Heat Units	Temp. of Six Hottest Weeks.	Mean Annual Temp.
		Days.			
Penticton.....	'08-'10	220	12,555.5	65.8	47.2
Kamloops.....	'01-'10	217	12,913.3	69.7	47.8
Summerland.....	'08-'10	211	12,275.7	67.9	46.2
Nelson.....	'04-'10	208	11,786.0	65.3	46.6
Salmon Arm.....	'07-'10	207	11,693.2	66.8	45.6
Kelowna.....	'01-'10	204	11,721.1	66.5	46.0
Vernon.....	'02-'10	202	11,690.7	66.9	45.1
Midway.....	'01-'02	198	11,386.7	64.9	44.2
Tobacco Plains.....	'06-'10	194	10,879.8	64.9	47.5
Revelstoke.....	'04-'10	188	10,506.1	63.9	43.3
Cranbrook.....	'01-'02	188	10,327.4	62.9	42.7
Golden.....	'02-'10	174	9,427.8	60.4	38.9

In the above table it is shown that the length of the growing season varies. Golden, with 174 days, has a much shorter season than any other point in our table, and it will be noticed that the growing season is longest at those points nearest the Cascades. Two slight exceptions occur in the case of Nelson and Salmon Arm, in each of which the season is lengthened by the immediate proximity of a large body of water. The slightly longer season registered for Penticton than for Summerland is probably due to the records being taken quite close to the lake at the former point, as against three miles from it and at 300 feet elevation above it in the latter.

Comparing the total number of heat units received at these various stations we find that a similar variation occurs.

As the total number of heat units is a direct statement of the combined length and intensity of the growing season, we get a fairly accurate means of comparison of the amount of evaporation likely to occur. We would expect that the total evaporation at Kamloops, with 12,913 heat units annually, would be around thirty-five per cent greater than at Golden with 9,427, and possibly twelve per cent greater than at Vernon with 11,691 heat units.

The average mean temperature of the six hottest weeks given in the fourth column indicates the relative amounts of water likely to be required at the critical period when the water-supply is becoming less plentiful, and evaporation proceeding most rapidly. It will be noted that the Thompson valley is the hottest one, and that the temperature drops gradually as we get into the regions of greater precipitation and, possibly, greater cloudiness and humidity.

#### RELATIVE HUMIDITY.

The greater the percentage of moisture already carried in the air, the less evaporation takes place. It is unfortunate that in this respect, as in the matter of evaporation studies, no records are available for this province, and we are not in a position to state at all definitely that there are differences in the humidities in the various parts of the Dry Belt. I believe it safe to assume that the humidity will vary in proportion to the precipitation and the mean temperature, in which case the rule which we have previously indicated would seem to hold good, viz., that the relative humidity is least in those belts closest to the Cascade range.

#### SUNSHINE RECORDS.

We are, unfortunately, unable to give comparative figures on the amount of sunshine received at the various points in the Dry Belt, important as such records would be to the fruit industry. However, we present in Table 4 a record of the hours of sunshine at Kamloops, Summerland and Agassiz by months—average of the years 1909, 1910, and 1911.

TABLE 4.

HOURS OF SUNSHINE AT KAMLOOPS, SUMMERLAND AND AGASSIZ, B.C., BY MONTHS: AVERAGE OF YEARS 1909, 1910 AND 1911.

	Kamloops.	Summerland.	Agassiz.
January .....	66-90	61-45	27-32
February .....	94-47	95-40	64-24
March .....	183-53	196-83	126-61
April .....	215-32	234-71	162-86
May .....	201-28	244-28	165-61
June .....	270-55	269-91	170-53
July .....	315-85	336-49	230-51
August .....	257-32	266-79	142-91
September .....	192-55	189-42	129-27
October .....	143-75	144-53	101-54
November .....	67-95	63-99	39-95
December .....	50-40	33-91	50-57
Total .....	2,119-87	2,137-01	1,411-92

It will be remarked that the dry-belt points with similar precipitation show a most trifling difference in total hours of sunshine received in an average of three years, Summerland having 17-14 more hours than Kamloops. Agassiz, which we may take as representing a part of the Coast region, has only about 66 per cent as much with 1,412 hours.

There are, however, considerable variations from year to year in the amounts of sunshine received, just as there are in rainfall and in temperature. In this connection Table 5 shows the monthly totals for Summerland, 1909, 1910, and 1911, which are very interesting.

TABLE 5.

HOURS OF SUNSHINE AT SUMMERLAND, B.C., 1909, 1910 AND 1911, BY MONTHS.

	1909.	1910.	1911.
January .....	56-24	74-00	54-12
February .....	73-54	103-48	109-18
March .....	200-12	183-30	207-06
April .....	239-48	187-30	287-36
May .....	257-54	263-00	212-30
June .....	297-18	231-24	278-30
July .....	302-30	362-00	342-18
August .....	315-60	237-54	247-24
September .....	210-54	194-24	165-48
October .....	115-24	106-18	212-18
November .....	69-54	51-00	71-42
December .....	25-36	31-06	45-30
Total .....	2,165-68	2,024-54	2,230-12

It will be noted that 1911 had 10 per cent more sunshine than 1910, which would be expected to have a great influence on the amount of evaporation.

## THE INFLUENCE OF WIND ON EVAPORATION.

The effect of wind in causing evaporation is likely to be a most important one, especially if, in conjunction with it, the air is low in humidity or high in temperature. Our meteorological records, unfortunately, give no indication of the amount of wind in the various parts of our interior, but, if we are to take the results of observation, we are probably safe in saying that in the great Dry Belt of the province there is more wind in the valleys closest the mountains than in those further away. The absence of wind on the Arrow and Kootenay lakes as compared with the Thompson and Okanagan valleys is quite commonly commented upon.

## SUMMARY.

The use and duty of water in the irrigated districts of British Columbia will be influenced considerably by the variation of climates in the different valleys.

The valleys nearest the Cascade range have the lowest precipitation, which increases as we reach a greater distance from the mountains.

The increased precipitation, as we proceed eastward, comes more and more in the spring months, when it is most useful in replacing irrigation.



The precipitation varies over a wide range from year to year, and it is necessary for the irrigationist to inform himself by actual trial of the amount of moisture in the ground, and the depth to which it reaches.

The character of the summer rains is not likely to vary in different districts, nor is the rainfall or melted snow likely to be a matter of particular consequence.

The factors affecting the amount of evaporation are the length and the intensity of the growing season, the temperature of the six hottest weeks, the amount of sunshine received, the relative humidity of the air and the amount of wind.

As a rule the growing season is longest nearest the Cascades, and shortest in the districts furthest from them. The total number of heat units and the temperature of the six hottest weeks, which are related to the growing season, follow the same law. We have every reason to believe that the humidity of the air is lowest in the most westerly valleys. The amount of wind we would expect from observations, to be greatest in the valleys nearest the Cascades, though this is more or less a local condition, depending on topography.

Summing up our conclusions, we would expect that as far as climate is concerned, more water will be required in the Thompson, Similkameen and Okanagan valleys than in the Upper Okanagan or Boundary country, and in this respect it is not unlikely that the difference will be close to twenty per cent of the total amount of water used.

CHAIRMAN.—Mr. Rankin wishes to make an announcement.

MR. RANKIN.—Mr. J. W. Shaw, Editor of the *National Land and Irrigation Journal*, Chicago, was in Calgary a few days ago, prepared and anxious to come to this convention, but much to his disappointment was recalled by an urgent telegram. He has sent the following letter, which speaks for itself:—

NATIONAL LAND AND IRRIGATION JOURNAL,

30 SOUTH MARKET STREET, CHICAGO, August 14, 1912.

NORMAN S. RANKIN, Esq.,

Calgary, Alta.

DEAR SIR,—Have recently returned from the Canadian West after having travelled across the great wheat belt of Saskatchewan and into the mixed farming districts of Alberta, where I investigated the irrigation situation being developed by the Canadian Pacific Railway Company.

It was with much regret that I was compelled to leave Canada before the Irrigation Association meeting at Kelowna, as I had expected coming in closer contact with that body, and learning from headquarters their plans for further work.

I have sent two hundred copies of the *National Land and Irrigation Journal* for July, which I wish you would place before the members to notify them of the fact that we are an international journal so far as development work is concerned, and further to assure them that we are vitally interested in their work in the Canadian West, and will be glad to have them become permanent readers of our journal as well as contributors to its columns where this is desired.

It is the aim of this journal to be the mouthpiece of all those forces at work in the interest of reclamation and irrigation throughout Canada as well as the United States, and should they see fit to so recognize us, we will so far as we are able, give their work the prominence it deserves.

With congratulations for the great work which has been done up to this time, and with our very best wishes for the success of this movement in the future, believe me,

Most respectfully,

(Signed) J. W. SHAW,

*Editor.*

Mr. Shaw states that the story of the Kelowna convention will appear in the September number.

CHAIRMAN.—Before this meeting closes, I wish to direct your attention to the fact that the session to-morrow morning will be the final session of this convention, and will include the important business of the selection of officers and the place of meeting for next year.

The convention will now adjourn.

### FRIDAY, AUGUST 16.

The convention was called to order at 9 a.m.

CHAIRMAN.—We will now proceed with the election of officers for the ensuing year. Nominations are now in order.

Professor ELLIOTT.—In voting for the executive will it be necessary to vote four for British Columbia and four for east of the mountains?

CHAIRMAN.—That has been recognized as an unwritten rule, and I think it should be expressed as the sense of the delegates, so that this course may be followed in the present instance.

Mr. WOLLASTON.—I move that the rules be suspended so as to permit of four members from east of the mountains and four from the west thereof being duly elected members of the Executive Committee.

CHAIRMAN.—You have heard the resolution. Carried.

The following officers were elected:—

Hon. President—Hon. Geo. H. Bulyea, Lieutenant Governor of the Province of Alberta.

President—Hon. Duncan Marshall, Minister of Agriculture for the Province of Alberta.

First Vice-president—W. Crawley Ricardo.

Second Vice-president—J. S. Dennis.

Permanent Secretary—Norman S. Rankin.

Executive Committee—Messrs. A. S. Dawson, W. H. Fairfield, William Pearce, W. J. Elliott, Thomas Bulman, F. J. Fulton, J. A. MacKelvie and C. W. Dickson.

Moved by W. H. Fairfield, seconded by C. E. Lawrence, that the convention of the Western Canada Irrigation Association be held at Lethbridge, Alberta, in 1913.—Carried.

Mr. E. Foley-Bennett, President of the Penticton Board of Trade, announced that Penticton would endeavour to secure the convention in 1914, while Mr. R. C. Pegler, President of the Bassano Board of Trade, stated that Bassano would like to see the convention held at that point in 1915.

CHAIRMAN.—The members of the new Executive Committee will meet at the close of this convention. At one of our early sessions I had the privilege of reading a telegram from Sir Richard McBride with reference to the success of this convention. I think it would be in order if the convention expressed appreciation of this in a telegraphic message indicating to Sir Richard the success we have achieved at this meeting. I would, therefore, ask your approval of the following message which has been drafted by the secretary.

(The telegram was enthusiastically approved, and is reproduced early in this report.)

Mr. PEARCE.—I would desire to move a vote of thanks to the citizens of Kelowna for the right royal way in which they have welcomed us, and would particularly desire to thank them for the motor trips, only partly executed on account of the weather, and their good intentions for those intended. Nature, however, stepped in and frustrated their efforts to some extent. I also particularly desire to thank the parties who so kindly furnished the sumptuous banquet to the motorists and visitors. Unfortunately, all were not able to partake thereof, but it was their loss, and I think the hearty thanks of every one are due to the gentlemen who so kindly furnished the same. I, therefore, again desire to say, as briefly as possible, that this convention desires to extend its heartfelt thanks to the citizens of Kelowna and all who have in any way contributed to the right royal welcome we have received. (Applause.)

CHAIRMAN.—Before putting that resolution I would like to express my personal satisfaction at the splendid treatment we have received at the hands of the citizens of Kelowna. It has been a pleasure to me as retiring president to preside over the deliberations of this convention, and it is also a very great pleasure indeed to be able to support the vote of thanks now before the delegates. It is a pleasure to feel on going away that we have left behind the most successful convention in the history of the Western Canada Irrigation Association. (Applause.) I hardly think I need put it to the vote, but as it requires to be displayed on the minutes I would ask all in favour to indicate accordingly. Carried unanimously.

CHAIRMAN.—Is there any other business?

Mr. LAWRENCE.—I would remind you that the special committee for British Columbia has not yet been appointed, including a local secretary, in accordance with the resolution passed.

CHAIRMAN.—I think that could be safely left to the Executive Committee.

I would ask Professor Lewis if he would favour us with a short address, in which I am sure many of the delegates would be interested.

Professor LEWIS.—Mr. Chairman, ladies and gentlemen, I wish to make just a few remarks along the line of one of the most important questions, I believe, facing the horticulturists of the Pacific coast at the present time. I cannot help feeling that the time is not far distant when the Pacific Coast states and this province are practically going to have a monopoly of the fruit industry of America. The class of men we have, the wonderful development that is taking place, the interest of the states and the provincial government, all seem to point to the fact that the time is not distant when the apple and pear industry will be handled on the Pacific coast in much the same way as the orange industry is now handled in southern California. We already have the world's markets for our products and yet, my friends, there is a terrible responsibility upon us if we are to hold up our reputation and build up our trade as we should. We must have proper organization and market distribution. The question of getting the right variety is perhaps the most critical of all. Natural conditions are such that practically every variety can be grown with some degree of success on this coast, but that does not mean that you can grow a great many varieties in any one district. I cannot help feeling that each one of these can grow certain varieties to the greatest degree of success. Soil is not the only requirement of fruit growing. We are prone to feel that if we get a chemical or physical analysis of the soil that is all that is necessary. If it was just a matter of soil there would be extensive areas in which we could grow the Winesap, for example, or Spitzenberg or McIntosh Red, but we find the opposite to be true, and that it is only in restricted areas that we can grow certain varieties to the greatest perfection.

Climatic condition is also an important factor. Experimental work points very strongly to this. Take the Spitzenberg apple. That originated along the Hudson river in New York. It does fairly well east of New York, but west of New York it does not do well or in the southern states, and only in very restricted areas on the coast will that apple succeed. It is very profitable when well grown, but least profitable if not well grown. The Northern Spy originated in western New York, with an elevation of fifteen to eighteen hundred feet. It is firm, of good size and colour, keeping till February, but when you get in eastern New York the apple becomes softer and does not have the snap, and you cannot seem to grow that apple very well in most regions on the coast. Take the Winesap. The Winesap group will do well in only a few places; in parts of North Carolina, West Virginia and a few areas in Washington that apple will do well. The Ben Davis group of apples, which originated largely in the Ozark mountains, does not do well except where there is an average summer temperature of at least sixty-three degrees. Where it is less than that, the apples fall off in colour. There are other apples, however, which are not so exacting in their requirements. It is a matter requiring the closest investigation, and you must study the length of the growing season, the maximum and minimum temperature, the winds during the night; all those and other points have an influence on apple production and determine the varieties most worth cultivating. Here in British Columbia the provincial government is doing all it can to work out these problems, and in Oregon they have ten men at work on this problem.

Here is a point. Up in a Hood River orchard they have an apple to-day which I predict in ten years will be a great money-maker. It is one of the Limber Twig group and grows very easily, coming into bearing in the fifth year. It is not subject

to many fungus diseases, and is a large, red apple. It is an old eastern apple and in the west has taken on new characteristics. It is a gold mine to the Hood River district, and you will find the same gold mines here after earnest study. (Applause.)

CHAIRMAN.—Mr. Dean will speak to us for a few minutes.

Mr. DEAN.—Mr. Chairman, Ladies and Gentlemen: Professor Lewis touched the keynote on the selection of the most suitable varieties. That is a paramount question for you to settle in this section of the country. If I might extend his idea a little farther, it would be along the lines of organization, to assist in the selling of the crop, because it makes no difference, friends, what success you have in the growing of the fruit and harvesting, if you cannot dispose of it at profitable prices. (Hear, hear.) That is the essential question—to sell the product for the best price—and we can follow all lines of business and find that the greatest successes depend upon proper organization and systematic operation. In the Northwest here, if you will organize and co-operate one with another, you can just as well sell your entire output through one selling agency as through a thousand different men in different sections of the country. The apples that come from the Okanagan, Hood River and other sections of the country could be branded as apples from those sections, but all under the print of an honest packer. In the eastern market when a man buys a box of apples they leave a taste like more in his mouth and he buys a box of the same brand next time. You must first select the proper variety to grow to highest standard of excellency and then put them on the market through an honest packer and at a good price. (Applause.)

CHAIRMAN.—Professor Elliott will address us.

## IRRIGATION AND THE GARDEN.

By PROF. ELLIOTT.

Mr. PRESIDENT, LADIES AND GENTLEMEN.—Irrigation to many localities is a veritable boom and yet irrigation may have its harmful, as well as its beneficial, influences when handled carelessly or when handled by one who does not understand its use.

A month or two ago I saw a man irrigating his garden, and he had run so much water on the soil that he sank to his knees as he puddled around to direct the water with his shovel. That was not irrigation; it was folly. He was evidently going upon the theory, that if a little water was good a lot was better. The result was disastrous, for the heavy flooding of his land was having four very serious evil effects upon the growth of his crops:—

1. He was lowering the temperature of the soil and hence retarding the growth.
2. He was excluding air, which is an absolutely essential requisite to plant growth.
3. The lowering of temperature and excluding air has a serious effect in lessening the production of soluble plant food.
4. The combination of these above points hinders ripening, frequently to such an extent that the grain or vegetable is not properly matured, and hence has not the market value.





Onions on the Ground ready for Racking, Mr. Casonso's Ranch, Kelowna, B.C.

## IRRIGATION IS COMMON SENSE.

We might ask ourselves, what is proper irrigation, and the reply might be, the application of water artificially, and where necessary, in such quantities as to produce a fair yield of properly matured produce. So proper irrigation comes to be the common sense application of water to growing plants. The point is not how much water can I use, but how little can I use to attain the desired results. And right here is where we find a great difficulty with many water users. If the water is in the ditch, they cannot bear to see it going past, but will run it on the land, with little regard for the amount necessary.

A point all competent irrigators agree upon is, that one should rather under-irrigate than over-irrigate.

## HOW MUCH WATER TO APPLY.

There is no fixed rule for the application of water to any crop. One locality may demand a certain amount while another locality may require an entirely different amount. This amount is influenced largely by three things:—

1. The amount of evaporation.
2. The character of the soil.
3. The character of the produce grown.

For instance, the northern part of Alberta, about Edmonton, gets about the same rainfall as certain areas in Texas, and, where the Edmonton district requires no irrigation, Texas requires a great deal. The main reason for this is the excessive evaporation due to the intense heat. A heavy rain may fall and, in a short time, the soil may be as dry as ever—all due to evaporation.

The character of the surface soil and the subsoil also plays an important part, in that evaporation is aided or retarded by its sandy, clayey or gravelly character. Thus the amount of evaporation and the character of the surface soil and the subsoil will influence us very materially in the amount of water we should apply. The character of the crop also has its influence, but this will be discussed more particularly when we discuss the various garden crops.

## WHEN DO WE REQUIRE IRRIGATION?

Here again no hard and fast rule can be given. Someone has unofficially stated that for districts similar to Montana, British Columbia, Alberta, &c., irrigation may be deemed advisable, where the average precipitation falls below twenty inches. This has come to be somewhat generally accepted, although it does not mean that paying crops may not be grown, under certain conditions, with less than twenty inches of water, nor does it mean that considerable advantages may not be added when the annual precipitation is considerably above twenty inches. The other conditions, mentioned above, need to be taken into account also. However, the division between dry and irrigated areas may be placed, with a certain degree of safety, at about twenty inches of precipitation.

This fact is also true, that in districts where the precipitation is about twenty inches, there is scarcely a year, even among the wettest years, where some of the

many crops grown upon the ordinary farms may not be greatly benefited by a judicious application of water.

We can all remember, almost in any district, where a few weeks of drought would come and where the owners of crops would give almost anything for the possibility of applying irrigation water. This may be true in areas where there is considerably above twenty inches, then much more true is it in areas where the average annual precipitation is in the neighbourhood of twenty inches, or below this point.

In the Strathmore district the average precipitation, covering a number of years, is fifteen to seventeen inches. During 1911 we had an abnormally wet year, with a precipitation of something over twenty inches, and, even in that year, in the forepart of June, when it was extremely hot and dry, alfalfa was greatly benefited by a good application of water.

If this is true with general grain and fodder crops, how much more is it with the garden crops? Vegetables and fruit are very largely composed of water, and, consequently, the production of large yields will come as the result of the ability to apply, either naturally or artificially, considerable quantities of water.

We will now submit a list of the garden crops grown in the Strathmore vicinity, with the time of irrigation, and also some of the advantages of the artificially applied water.

#### SMALL FRUITS.

Among the small fruits we grow successfully are the red, white, and black currants and all varieties of gooseberries. With these plants irrigation water is applied first from the middle to the end of May. This induces the plants to throw out a large amount of fruit bloom, and then after the fruit is set a judicious application of water induces the production of a large crop of luscious berries.

#### STRAWBERRIES.

With strawberries we have found one application to be desirable and sufficient. With this fruit we have had considerable success. By covering the plants two or three inches deep with well rotted horse manure and leaving this covering on until about the end of May, we control, almost perfectly, the time when our fruit will be ready for market.

In Calgary we get British Columbia strawberries during the early summer months, but in Alberta by somewhat controlling the maturing of the fruit with the manure mulch, our berries come on to the market from July 15 to August 20. Thus they are brought on the market at a time when there is not a competing strawberry between Vancouver and Winnipeg, and at a time when the first imported fruits on our market are rather high in price.

The irrigation water is applied just as the first bloom appears; this induces a heavy fruiting and gives the plant sufficient moisture to last through July, when we frequently have warm, dry weather. By this method the plant has a sufficiency of moisture to mature the entire crop, without having the last berries dwindle down to small size as is frequently the case in dry weather.

We find one irrigation sufficient, unless extremely dry weather is experienced.

and have discontinued the irrigation during the fruit-producing time, on account of the fact that the berries are apt to grow too rapidly and thus, because they are soft, ship in poor condition. One thorough irrigation has produced a fruit season of almost six weeks and had produced with us almost \$500 as a gross return per acre.

#### POTATOES.

With potatoes we have not always had the best results with irrigation. We can produce a very large tonnage but not the quality. Heavy irrigation of potatoes produces a soggy potato that is a poor baker. We obtain our best results by planting our potatoes on ground that has been used for peas, rape or garden truck, and that has had a good irrigation the year previous. It appears that a sufficiency of moisture is carried in the subsoil to give us plenty for potatoes. We work particularly for quality with this crop and not so much for quantity.

#### RHUBARB (PIE PLANT).

Here again we have done remarkably well with this crop. It is a fact that we have planted the seed in August, then after the plants are up two or three inches they were given a slight irrigation. The plants were transplanted the next spring, irrigated in June, and in July, exactly eleven months from the time the seed was placed in the ground, we were cutting the plant for market. Those who have grown rhubarb know that it generally takes two years to grow this plant successfully from seed.

#### OTHER VEGETABLES.

For the balance of the vegetables, generally, we have found irrigation to produce splendid results.

These would include beets, carrots, turnips, beans, radish, parsnips, cabbage, cauliflower, peas, spinach, &c.

We have found that irrigation produces a much larger tonnage, and, as this does not hurt the quality, as may be done with potatoes, there is this decided advantage. Cabbages and carrots may require slightly more care than the rest of the common vegetables, as a plentiful supply of water during a hot rapidly-growing period may cause the carrots to crack or split down the side and the cabbage to burst.

Green peas and spinach will take a plentiful supply of water, and, particularly with the peas, the continuance of the moisture supply will induce a long period of flowering and consequently a large crop.

With irrigation, second and third crops of such things as summer turnips, peas, radish, spinach, &c., may be set out, a thing that is not so feasible under other conditions as, of necessity, these would have to be sown during hot, dry weather, when it would be difficult to have seeds sprout or come to any value after sprouting.

A simple irrigation of the ground before these second and third crops are sown insures rapid germination, quick growth and additional profits.

There are many other phases of the irrigation of the garden that might be touched upon, but those given above will suffice to show the great benefit of irrigation in the production of garden produce. (Applause.)

A unanimous vote of thanks was passed to the chairman, Hon. W. R. Ross, who said in response:—

As retiring president, I may say that it has been a very great pleasure to me indeed to preside over the deliberations of this convention. I feel satisfied that we have had the most successful meeting we have ever held, and I hope that the next meeting will be even more successful. While, perhaps, I am severing my active connection as an officer of the association, I shall continue to take an active interest in the future work of the association. (Applause.)

A DELEGATE.—Might I offer a vote of thanks to the local secretary, Dr. Dickson, for his arduous work in connection with this convention? Unanimously seconded and carried.

Dr. DICKSON.—Mr. Chairman, ladies and gentlemen: I must thank you most heartily for your kind words of appreciation for anything I have been able to do for the welfare of the Western Canada Irrigation Association, and also for any pleasure you may have derived from your visit to Kelowna. I may say that in trying to arrange for the programme here I have had the most hearty co-operation, not only of the citizens at large, who have assisted me in every way in their power, but especially from the local committee appointed by the city and Board of Trade to co-operate in the programme and arrange for your entertainment. If it had not been for the assistance I have had from the citizens of Kelowna and from these other gentlemen, we could not have carried out our programme so thoroughly, and our appreciation of the fact that you appreciated what little we have done for you is the best word you can say for the local committee and myself.

Mr. LAWRENCE.—I don't think we ought to forget the permanent secretary. It is just as well to remember that the mainsprings of the watch are sometimes rather out of sight—not that the secretary has been out of sight; in fact, he has been so much in evidence that I think hundreds will have him indelibly impressed on their memories—but the work he has done in setting the cogs in motion has been so valuable that I think we ought to put our appreciation on record, and I have pleasure in moving that you, sir, should express the wish of the convention.

Mr. DUFRESNE.—I have pleasure in seconding that.

CHAIRMAN.—It has been moved and seconded that a hearty vote of thanks be passed to the permanent secretary, Mr. Rankin. Carried.

Mr. RANKIN.—Gentlemen, I can only thank you very heartily for the expression of your appreciation. It seems to me that the large attendance we have at this meeting is ample reward for the work which I have done, and aside from that I would recall to your attention the resolution which was passed and the very handsome way in which the executive have recognized my efforts, in giving me a grant and increasing the small salary which comes to me for doing the work of the convention. I had not expected anything; we are working for the good of the cause, and, as our income is just what we are able to get in grants from the provincial governments and the small grant given last year by the Dominion Government, I hesitated in accepting the grant at all. I may say that I believe we are on our feet now, and the experience



that is ours this year will go to assist us in getting a very much better convention in the future. I thank you very much for your motion, which I sincerely appreciate. (Applause.)

MR. LAWRENCE.—One thing ought to be mentioned and that is, the accord that exists between the Hon. Price Ellison, in his capacity in the government, and the members of this association. I may assure him that what he said in his first address to the association is very much appreciated, and we are looking forward to the carrying out of his views on the matter of which he spoke, and I think he should know how fully we are in accord with what he said. (Applause.)

HON. PRICE ELLISON.—Mr. Chairman and gentlemen: I am delighted indeed to have had the opportunity of attending this convention. The Department of Agriculture is trying to do all it possibly can in developing agriculture in this province. We have gone to the United States for the best men we could get, and have carried out many experiments which will prove of great benefit. It will mean a great deal to British Columbia, and the department has not considered the expense. The government has made large appropriations and we hope to continue doing so, and when the time and opportunity occurs, if any of your associations would like to have these men we shall be glad to consider your recommendations. We have done all we could up to the present time, but the problem is a large one and needs a great deal of co-operation. I am much impressed by the addresses given by Professor Lewis. It has occurred to me often that there are too many varieties of apples in a ten-acre lot. I am sure, gentlemen, that you will have the co-operation of the government in anything that will go to advance the interests of the fruit-growers and agriculture in general in British Columbia. (Applause.)

Moved by Mr. Pearce, seconded by Mr. Dawson, that the convention be finally adjourned.—Carried.

#### NEW EXECUTIVE COMMITTEE MEETS.

A meeting of the new executive was held at the close of the convention on Friday morning, at which were present Messrs. William Pearce, Thomas Bulman, A. S. Dawson, W. J. Elliott, C. W. Dickson and J. A. MacKelvie. The chair was taken by Mr. Thomas Bulman.

Moved by Mr. Pearce, seconded by Mr. Dawson, that Mr. J. S. Dennis be chairman of the Executive Committee for the ensuing year.—Carried.

Moved by Mr. Pearce, seconded by Mr. Dawson, that the secretary, after putting himself in correspondence with different members of the executive, select two delegates to the forthcoming National Irrigation Congress at Salt Lake City, to be approved by the chairman of the executive, Mr. Dennis.—Carried.

It was tentatively agreed that the special British Columbia meeting of the association be held at Victoria, B.C., on the 9th and 10th of January, 1913, and that Dr. C. W. Dickson, Kelowna, B.C., should act as local secretary in connection with that meeting.



The Delegates Visiting Summerland.

Photo by Rankin.



SS. *Okanagan* arriving at Penticton, August 16, 1912, with Delegates to the Convention Banquet.

### FRIDAY AFTERNOON AND EVENING.

The remainder of Friday was devoted to the programme outlined in the Interim Programme, which was greatly enjoyed by the delegates. It included also a short stop at Summerland, where the delegates visited the Fruit, Vegetable and Flower show, held under the auspices of the Women's Institute of British Columbia, which was formally declared open by the Hon. W. R. Ross.

The delegates then proceeded to Penticton, where they were the guests of the City Council and Board of Trade, and immediately on their arrival were taken for automobile drives around the orchards in the vicinity.

In the evening, about 124 delegates and their wives sat down to a banquet at the magnificent new Incola Hotel, which was gaily decorated for the occasion.

The address of welcome was delivered by Capt. T. M. Stevens, Mayor of Penticton, and the toasts to the guests was proposed by Mr. E. Foley-Bennett, President of the Penticton Board of Trade, and responded to by the Hon. W. R. Ross.

Among the other speakers of the evening were Hon. Price Ellison, Mr. George Harcourt, Professor Elliott, Dr. Elliott Rowe, Sir William Wilcocks, Dr. Samuel Fortier and Professor M. L. Dean.

The banquet was unanimously declared to be a fitting finale to the most successful convention in the history of the Western Canada Irrigation Association.









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WESTERN CANADA IRRIGATION  
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